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FLOOD INSURANCE STUDY

ORIGINAL

CALDWELL COUNTY, TEXAS
UNINCORPORATED AREAS

MARCH 18, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 480094

NOTICE TO
FLOOD INSURANCE STUDY USERS

This Flood Insurance Study was revised on March 18, 1986. Users should refer to the Revision Description section (Section 9.0) of this text for further information.

Part or all of this Flood Insurance Study may be revised at any time. The user is therefore cautioned that a published map revision (i.e., a revised Flood Insurance Rate Map) may not include a reprinting of the text, tables, and/or profiles, resulting in a discrepancy between the revised map and the original study components. It is the responsibility of the user to consult with community officials to obtain the most current Flood Insurance Study components.

Initial Flood Insurance Study Effective Date: March 15, 1982

Flood Insurance Study Revised: March 18, 1986

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PUBLISHED SEPARATELY:

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Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CALDWELL COUNTY, TEXAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in Caldwell County, Texas, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Caldwell County to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgments

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by URS Company, Consulting Engineers, Austin, Texas, for the Federal Emergency Management Agency, under Contract No. H-4643. This study was completed in February 1980.

1.3 Coordination

An initial coordination meeting, attended by representatives of Caldwell County, FEMA, and representatives of URS Company, was held on March 16, 1978 to explain the nature and purpose of the study and to establish the geographic limits of the study. A legal notice announcing the beginning of the study and stating its objectives was place in the local newspaper. During the course of the study, preliminary results of the hydrologic analyses were submitted to the Soil Conservation Service (SCS) and the U.S. Army Corps of Engineers (COE) for their review. The preliminary results of the study were presented at an intermediate coordination meeting attended by Caldwell County officials, representatives of FEMA, and URS Company. Following review by the County and incorporation of necessary changes, a final meeting was held and the final results were presented to the County on April 6, 1981.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Caldwell County, Texas. The area of study is shown on the Vicinity Map (Figure 1).

The following waterways were selected for study by detailed methods: the San Marcos River, an Unnamed Tributary to the San Marcos River, a shallow flooding area on an unnamed tributary to the San Marcos River, Tenney Creek, Campbell Creek, Seals Creek, a tributary to Seals Creek, West Fork to Plum Creek, Little West Fork to Plum Creek, and Big West Fork to Plum Creek. Other areas of the county will utilize Flood Hazard Boundary Maps (FHBM) to identify areas subject to flooding (Reference 1). Selection of areas for detailed study was based upon known problems, or upon suspected flood hazards for areas where development was projected to occur over the next five years through March 1983.

That portion of the San Marcos River studied in detail begins at the Caldwell County - Gonzales County boundary approximately 4.5 miles southeast of the City of Luling and extends upstream to the Hays-Caldwell County line approximately 2.8 miles southeast of the City of San Marcos, Texas. The Unnamed Tributary to the San Marcos River, lying to the east of the City of San Marcos, was studied from its confluence with the San Marcos River upstream to State Highway 21. The shallow flooding area was designated from the confluence with the San Marcos River upstream to above the Missouri-Kansas-Texas Railroad.

Tenney Creek and Campbell Creek both are within the Plum Creek watershed and those segments of the creeks studied in detail are just east and south of McMahan, Texas. The limit of detailed study for Tenney Creek begins 7,900 feet downstream of F. M. 3158 and extends upstream to the SCS floodwater retarding dam Site No. 28. Campbell Creek was studied in detail from its confluence with Tenney Creek upstream to the SCS floodwater retarding dam Site No. 29.

Seals Creek and its tributary studied in this report flow directly into the San Marcos River. The segments of these creeks which were studied by detailed methods lie approximately 2.0 miles west of the City of Luling. The study limits for Seals Creek begin at U.S. Highway 90 and extend upstream to State Highway 80. The tributary to Seals Creek was studied in detail from its confluence with Seals Creek upstream to State Highway 80.

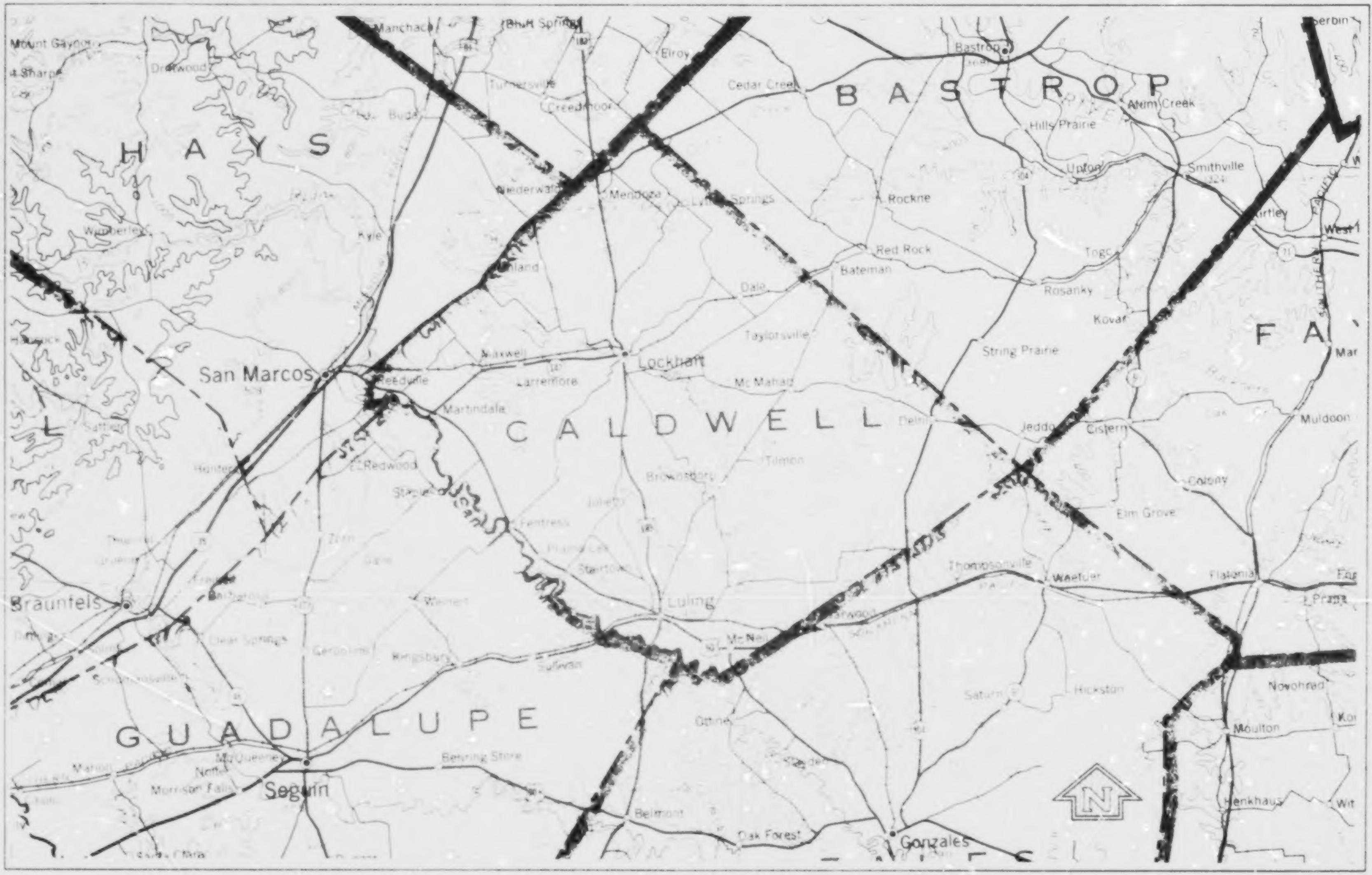

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

APPROXIMATE SCALE

8 0 8 16 24 MILES

VICINITY MAP

3

Finally, West Fork, Little West Fork, and Big West Fork are all tributaries to Plum Creek. The study area for these creeks is approximately five miles southwest of the City of Lockhart. The limit of detailed study for West Fork to Plum Creek extends from State Highway 20 upstream to where the confluence of Little West Fork and Big West Fork form West Fork. Little West Fork was studied in detail from its confluence with Big West Fork upstream 2,670 feet to an unnamed asphalt road. Big West Fork was studied in detail from its confluence with Little West Fork upstream 4,980 feet.

2.2 Community Description

Caldwell County is located in southcentral Texas approximately 30 miles south of the City of Austin. Lockhart is the county seat and the largest commercial and trading center serving Caldwell County's 22,100 population (Reference 2). U.S. Highway 183, State Highway 80 and the Missouri-Kansas-Texas Railroad are the major surface transportation arteries. The area is an agricultural and ranching center with some crude oil production and related oil field services. Beef cattle, cotton, and grain are the leading crops.

Topography of the area is nearly level to moderately steep, the soils have a wide range of permeability (Reference 3). Elevations vary from 375 feet to 750 feet based on the National Geodetic Vertical Datum (NGVD) of 1929. Caldwell County has a subtropical climate characterized by hot, high-humidity summers and mild winters. Average temperatures range from 41 degrees F in January to 96 degrees F in July. The annual precipitation is 32.65 inches, occuring mostly in the spring and fall months (Reference 2).

2.3 Principal Flood Problems

The areas studied in detail within Caldwell County experience flooding from the San Marcos River and its tributaries. Since it is predominantly rural, the county's primary flood damage is to cropland and pastureland. However, larger floods in the past have caused damage to residential property. Most of the flood-producing storms occur in the spring and fall, although intense local thunderstorms can produce flooding throughout the year.

The drainage area for the San Marcos River varies from nearly 500 square miles at the upstream limit of study to over 1,200 square miles at the downstream limit of study. Two U.S. Geological Survey (USGS) flood gaging stations are located on the San Marcos River, one at San Marcos and one at Luling. Although the period of record for the gaging station at Luling dates back to April of 1939, State Highway Department information estimates flooding extremes outside the period of record dating back to 1859. The five largest floods, either estimated or recorded, on the San Marcos River in descending order of magnitude were those of September 10, 1921, May 15, 1970, September 1952, 1929, and 1913. Other damaging floods are known to have occurred on the river in 1957, 1958, 1959, 1960, and 1968 (Reference 4).

Although frequent flooding has occurred in the other areas studied in this report, no accurate records for determining past extreme flooding events are readily available.

Figures 2 through 7 illustrate 100- and 500-year flood heights which can be expected at various locations within the study area.

2.4 Flood Protection Measures

To date, no specific measures for protection from flooding along the San Marcos River have been implemented or are under immediate consideration. However, of the other creeks studied in detail in this report, Tenney Creek and Campbell Creek have had flood protection measures implemented in their watersheds. In the immediate vicinity of McMahan, Texas, the SCS, as part of their Lower Plum Creek Watershed project (Reference 5), has constructed two floodwater retarding dams. They are designated as Site No. 28 and Site No. 29 for Tenney Creek and Campbell Creek, respectively.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, and 500-year period (recurrence intervals), have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50 year period is about 40 percent (four in 10), and for any 90 year period, the risk increases to about 60 percent (six in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

The procedures used by the SCS were adopted as the preferred method to compute peak discharges (Q) for the selected drainage areas associated with the streams in Caldwell County, except those of the San Marcos River.

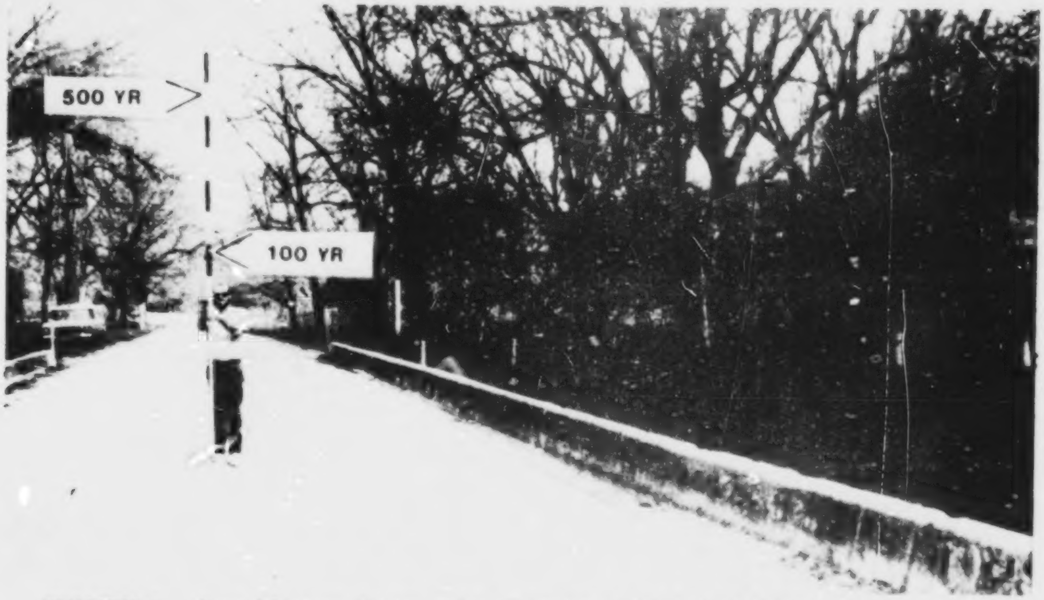

FIGURE 2: San Marcos River, F.M. Highway 1977, looking north.

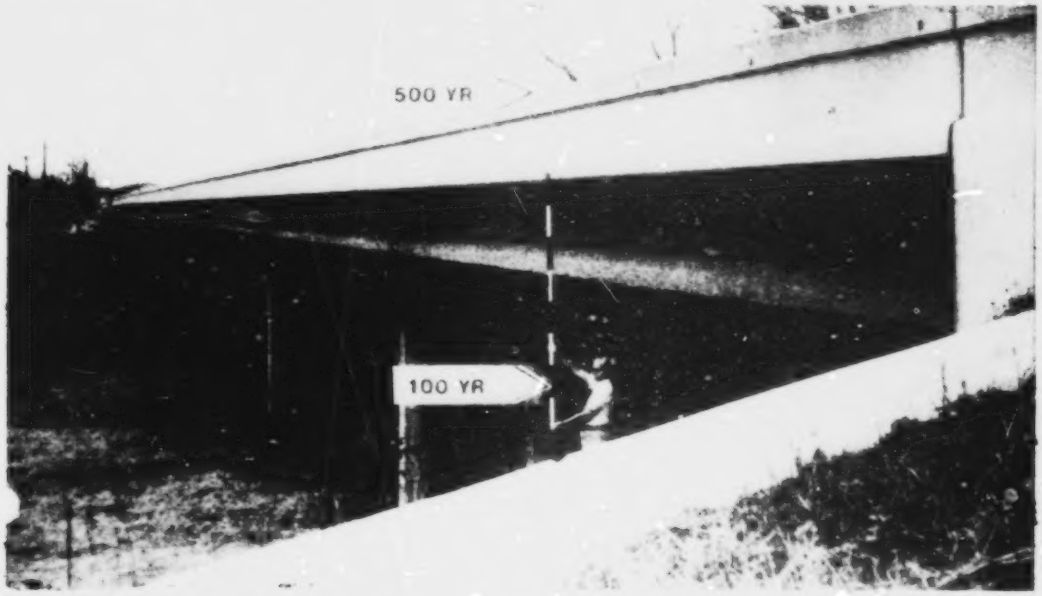

FIGURE 3: San Marcos River, State Highway 80 looking north towards City of Luling.

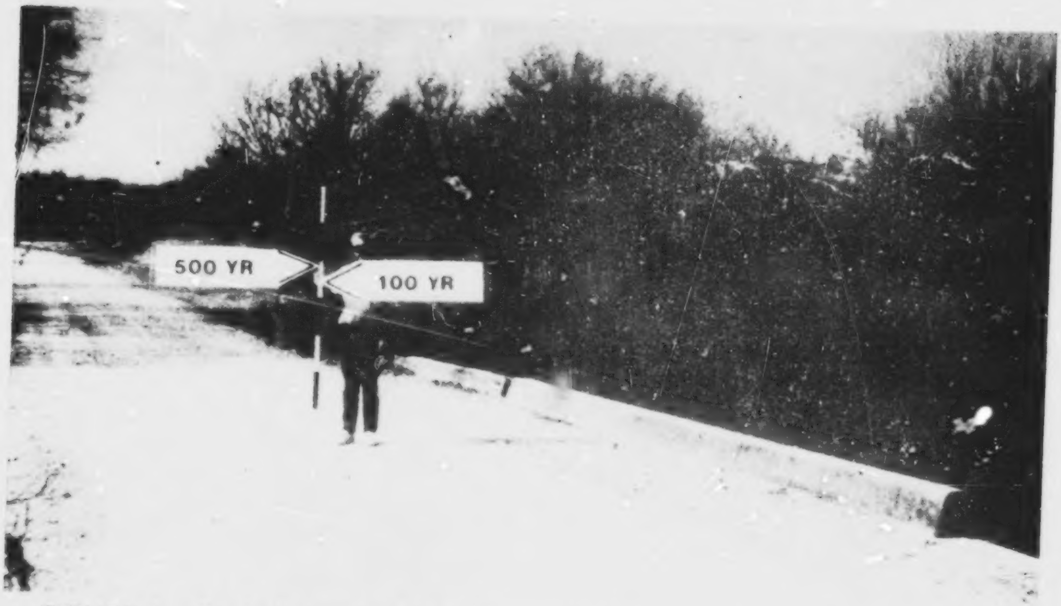

FIGURE 4: Seals Creek, Old San Marcos Highway, looking west.

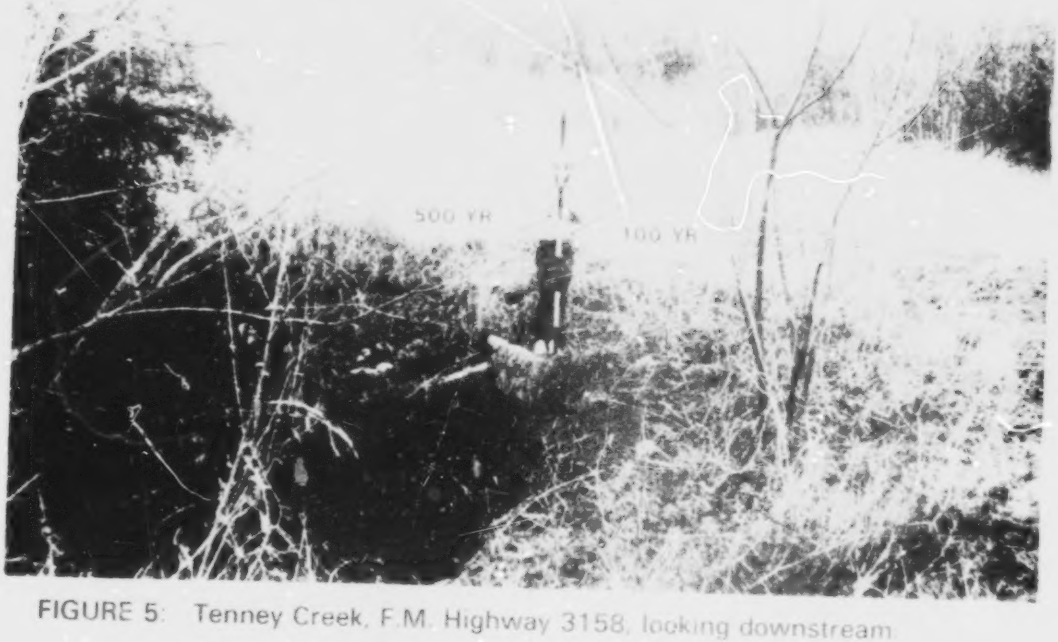

FIGURE 5: Tenney Creek, F.M. Highway 3158, looking downstream.

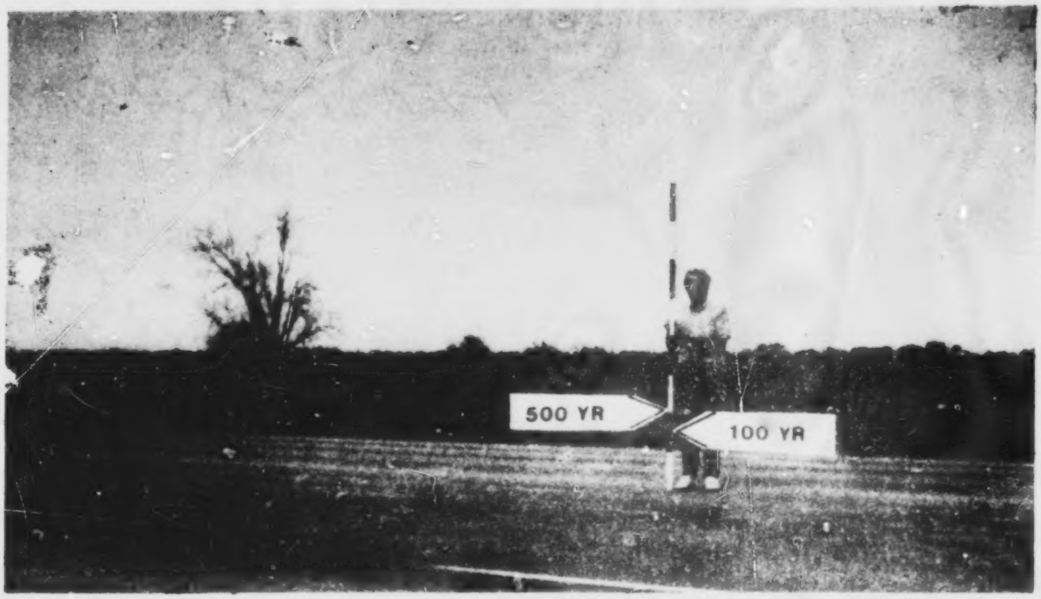

FIGURE 6: Unnamed tributary (to San Marcos River), State Highway 80, looking upstream.

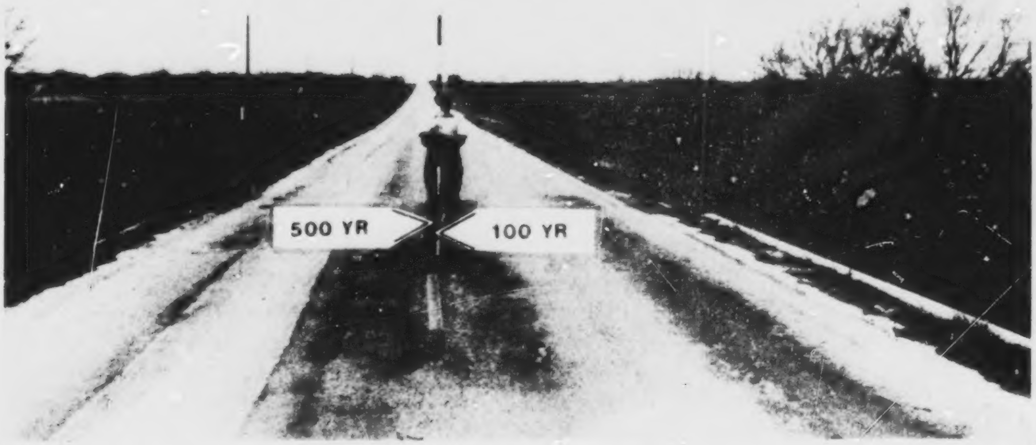

FIGURE 7: West Fork (to Plum Creek), State Highway 20, looking north.

The SCS method of estimating direct runoff from storm rainfall (Reference 6) is based on procedures developed by SCS hydrologists over the last three decades. Rainfall and watershed data, including soil properties, are included as hydrologic parameters in calculating peak flows. Soils are divided into four groups based on the minimum rate of infiltration obtained for a soil after prolonged wetting. Surface conditions are evaluated by land use and treatment classifications. Time of travel, peak flows, and accumulated runoff ratios from SCS dimensionless hydrographs are used to tabulate the design flood hydrographs and peak discharges for the 10-, 50-, and 100-year storms. The 500-year discharge is determined by a log-normal extrapolation of the 10-, 50-, and 100-year flows.

The physical parameters of soil type and group classification were determined following a field reconnaissance of the watershed and the use of the Soil Survey of Caldwell County, July 1978, published by the SCS (Reference 3). Each watershed was divided into the percentage of contributing soil group classification and land use cover, and calcuated composite curve number which describes the physical parameters was used to modify the unit hydrograph tabulations. Curve numbers used for this predominantly rural area ranged from 66 to 84. The additional parameters of drainage area and stream length were determined from topographic maps of the drainage basin (Reference 7). Rainfall data was obtained from the U.S. Weather Bureau's Technical Paper No. 40 (Reference 8).

For both Tenney and Campbell Creeks, SCS flood retarding structures determine the upper limits of detailed study. Peak flows generated from the watersheds upstream of the structures were routed through the structures using the COE HEC-1 computer program (Reference 9). These flows were then compared to peak flows generated by the portions of the watersheds defined by the detailed study limits (downstream of the flood retarding structures). The greater of these values were then used in determining flood heights along the two creeks.

Peak flood flows for the Unnamed Tributary to the San Marcos River and the shallow flooding area lying just to the east of the City of San Marcos were found to be affected by floodwater overflows from the adjacent Blanco River. Information supplied to URS/Forrest and Cotton, Inc. by the SCS and dated June 26, 1978, provided peak flows (determined by the U.S. Water Resources Council Frequency Analysis Method, Bulletin 17) and associated overflows for the Blanco River at the points in question.

Flows for the portion of the San Marcos River lying within the limits of detailed study were obtained from a previous Flood Insurance Study completed by the SCS and dated September 1, 1978, for the unincorporated areas of adjacent Guadalupe County (Reference 10).

The peak discharge-drainage area relationships for the selected recurrence intervals are presented in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
SAN MARCOS RIVER					
State Highway 80	838	42,125	98,903	150,100	304,200
U.S. Highway 90	788	40,696	95,139	145,650	296,000
F.M. 671	779	40,377	94,394	144,750	293,500
F.M. 20	594	38,650	90,900	126,850	255,800
Upstream county boundary	533	36,600	86,000	119,000	243,000
UNNAMED TRIBUTARY TO THE SAN MARCOS RIVER					
State Highway 80	5.63	3,093	19,400*	81,000*	228,000*
Missouri-Kansas-Texas Railroad	4.09	2,247	19,400*	81,000*	228,000*
State Highway 21	3.06	2,013	2,832	35,566*	129,043*
SHALLOW FLOODING AREA					
Upstream of the Missouri-Kansas-Texas Railroad	**	**	**	7,000*	**
Upstream of State Highway 80	**	**	**	27,000*	**
TENNEY CREEK					
Lower limit of detailed study	14.89	1,130	1,665	2,149	2,752
Below confluence with Campbell Creek	13.95	862	1,269	1,666	2,132
Above confluence with Campbell Creek	8.29	476	699	920	1,176
Below SCS Dam Site No. 28	7.33	46	46	46	762
CAMPBELL CREEK					
Confluence with Tenney Creek	5.66	386	569	746	955
Below SCS Dam Site No. 29	4.88	55	61	65	143
SEALS CREEK					
U.S. Highway 90	19.00	6,543	9,039	10,743	13,407
Below confluence with Unnamed Tributary	18.14	6,248	8,629	10,285	12,834
Above confluence with Unnamed Tributary	15.74	5,584	7,624	9,053	11,240
State Highway 80	15.14	5,437	7,439	8,767	10,893
SEALS CREEK TRIBUTARY					
Confluence with Seals Creek	2.40	1,620	2,241	2,642	3,299
State Highway 80	2.25	1,519	2,101	2,477	3,092

TABLE 1 - SUMMARY OF DISCHARGES - cont.

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
WEST FORK PLUM CREEK					
State Highway 20	7.26	3,900	5,448	6,209	7,782
LITTLE WEST FORK					
Confluence with Big West Fork	3.54	2,446	3,424	3,911	4,907
BIG WEST FORK					
Confluence with Little West Fork	3.15	2,176	3,048	3,479	4,366
Upper limit of detailed study	2.85	1,970	2,757	3,177	3,986

*Flows derived from "break-out" of Blanco River
**Not determined

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in Caldwell County were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flood sources.

These elevations were computed through use of the COE HEC-2 step-backwater computer program (Reference 11).

Cross sections for the backwater analysis of the San Marcos River and the other creeks studied were located by field reconnaissance and were field-surveyed using 3rd order accuracy. The cross sections were taken at close intervals above and/or below bridges and culverts in order to compute the significant backwater effects of these structures on the waterway. The structures studied in detail were field-surveyed and compared to available bridge plans for elevation data and structural geometry accuracy.

Selected cross section locations are shown on the Flood Profiles (Exhibit 1).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Boundary and Floodway Map (Exhibit 3).

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgement and based on field observations of the channels and floodplain areas. Roughness values for the main channel and overbanks of the waterways studied are shown in the following table.

Stream	Roughness Values Channel	Overbank
San Marcos River	0.030 - 0.080	0.035 - 0.095
Unnamed Tributary (to San Marcos River)	0.018 - 0.075	0.040 - 0.090
Tenney Creek	0.030 - 0.070	0.040 - 0.070
Campbell Creek	0.025 - 0.080	0.040 - 0.055
Seals Creek	0.030 - 0.050	0.040 - 0.080
Seals Creek Tributary	0.035 - 0.060	0.040 - 0.080
West Fork	0.025 - 0.070	0.050 - 0.070
Big West Fork	0.020 - 0.055	0.050 - 0.060
Little West Fork	0.020 - 0.055	0.050

As mentioned previously, water-surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 step-backwater computer program. Flood profiles were drawn showing computed water surface elevations for floods of the selected recurrence intervals. Stating water-surface elevations for all of the waterways studied in detail were calculated using the slope-area method. All elevations are referenced from NGVD. Elevation reference marks used in this study are shown and described on the map.

It should be noted that the Unnamed Tributary to the San Marcos River required special attention in determining the flood elevations for the 100- and 500-year storms, due to the excessive flows generated from the overflow of this tributary's watershed into the adjacent watersheds to the east and south. These breakouts were shown to occur from upstream of the Missouri-Kansas-Texas Railroad, downstream to State Highway 80. As a result of this situation, flows had to be progressively reduced at downstream cross sections utilized in the HEC-2 program. Consequently, these breakout flows were used to determine the extent of shallow flooding in the adjacent watershed. The resulting water-surface elevations for this area are summarized in Table 2, "Summary of Elevations."

The hydraulic analyses for this study are based on the assumption of unobstructed flow. Therefore, flood elevations as shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed and operate properly.

TABLE 2 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION ABOVE NGVD (feet) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SHALLOW FLOODING AREA				
Just below Missouri-Kansas-Texas Railroad	*	*	570	*
Just above State Highway 80	*	*	558	*

*Not determined for shallow flooding

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated with the aid of existing topographic maps (Reference 7). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100- and 500-year floods are shown on the maps. Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding. Owing to limitations of the map scale and/or lack of detailed topographic data, such areas are not always shown.

To assist users of the Flood Insurance Study to locate, in the field, the actual boundaries of the base flood or to assist users in determining the elevations of specific sites or structures in relation to the base flood, elevation reference marks have been established by URS Company. These reference marks include previously existing Coastal and Geodetic Survey Bench Marks, as well as the reference marks established during the current study.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated for selected cross sections and are shown in the Floodway Data Table (Table 3).

As shown on the Flood Boundary and Floodway Maps (Exhibit 3), the floodway widths were determined at cross sections; between cross sections the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood plain are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 8.

Due to the large breakout of flows from the watershed of the Unnamed Tributary to the San Marcos River, encroachments for this creek were not possible. In this case, any encroachment would have produced increases in flood heights greater than the one foot limit specified by FEMA.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Unnamed Tributary To San Marcos River								
A	5,390	4269/2935[2]	17,577	4.2	561.8	561.8	561.8	0.0
B	9,525	3194/2295[2]	19,136	3.9	570.9	570.9	570.9	0.0
C	11,550	8325/4315[2]	36,403	2.2	583.7	583.7	583.7	0.0
D	17,160	4955/4080[2]	36,434	2.2	584.9	584.9	584.9	0.0
Tenney Creek								
A	0	144	661	3.3	426.4	426.4	427.4	1.0
B	4,800	113	534	3.1	437.7	437.7	437.9	0.2
C	8,330	150	454	1.5	444.7	444.7	444.9	0.2
D	10,060	40	170	1.6	445.5	445.5	446.2	0.7
E	13,500	38	111	0.4	447.2	447.2	447.4	0.2
Campbell Creek								
A	370	39	259	3.8	439.0	439.0	439.0	0.0
B	1,400	47	437	2.2	440.5	440.5	440.6	0.1
C	2,800	42	309	2.1	445.5	445.5	445.7	0.2
D	6,450	28	141	1.6	455.6	455.6	455.6	0.0
E	9,900	20	14	4.8	462.1	462.1	462.1	0.0

[1] Feet above confluence with Tenney Creek for Campbell Creek; feet above downstream limits of detailed study for Tenney Creek; feet above confluence with San Marcos River for Unnamed Tributary to San Marcos River.

[2] Total width/width within study limits.

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

FLOODWAY DATA

UNNAMED TRIBUTARY TO SAN MARCOS RIVER-TENNY CREEK-CAMPBELL CREEK

TABLE 3

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
San Marcos River (continued)								
W	245,000	456/130	10,015	11.6	544.3	544.3	544.5	0.2
X	255,940	800/310	18,331	6.3	558.3	558.3	558.7	0.4

---

[1] Feet above confluence of Plum Creek

[2] Width/width within county boundary

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

FLOODWAY DATA

SAN MARCOS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
San Marcos River								
A	0	1977/1280	56,234	2.7	353.8	353.8	354.8	1.0
B	11,120	1668/1090	37,279	4.0	354.9	354.9	355.9	1.0
C	29,610	2601/500	48,109	3.1	357.4	357.4	358.3	0.9
D	37,200	2550/1500	27,128	5.5	358.4	358.4	359.2	0.8
E	50,690	3700/150	49,226	3.0	363.7	363.7	364.5	0.8
F	77,800	3875/40	40,456	3.6	375.1	375.1	376.1	1.0
G	87,350	4000/1800	44,440	3.3	382.0	382.0	382.7	0.7
H	100,700	4400/4250	34,914	4.2	392.1	392.1	393.0	0.9
I	114,866	1515/20	19,977	7.2	405.3	405.3	406.3	1.0
J	126,500	1530/1415	27,985	5.2	416.0	416.0	416.8	0.8
K	136,000	1100/400	16,323	8.9	424.1	424.1	424.7	0.6
L	142,470	2250/1980	23,675	6.1	432.3	432.3	433.2	0.9
M	151,825	2250/700	30,319	4.2	442.5	442.5	443.4	0.9
N	163,100	1330/1220	19,616	6.5	450.3	450.3	451.3	1.0
O	172,100	795/610	14,239	8.9	460.1	460.1	460.9	0.8
P	187,800	1600/210	21,861	5.8	475.4	475.4	476.1	0.7
Q	199,855	500/4850	37,390	3.4	482.0	482.0	482.6	0.6
R	211,600	3987/3660	23,343	5.1	496.5	496.5	497.3	0.8
S	220,800	1229/900	17,940	5.6	508.4	508.4	509.3	0.9
T	226,945	1900/1700	29,320	3.4	520.9	520.9	521.7	0.8
U	229,963	2590/210	16,784	7.1	523.5	523.5	524.3	0.8
V	236,215	848/200	16,164	7.4	534.1	534.1	535.0	0.9

[1] Feet above confluence of Plum Creek.
[2] Total width/width within study limits.

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

FLOODWAY DATA

SAN MARCOS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Seals Creek								
A	680	500	2,975	3.6	368.4	366.4[3]	366.8[3]	0.4
B	3,360	505	3,612	2.9	369.7	369.7	370.6	0.9
C	6,100	1,232	5,862	1.8	371.3	371.3	372.2	0.9
D	7,645	404	2,651	3.3	373.8	373.8	374.7	0.9
E	9,230	550	3,515	2.5	375.0	375.0	376.0	1.0
Seals Creek Tributary								
A	1,360	200	840	3.1	371.3	371.3	372.3	1.0
B	1,760	100	362	7.1	374.0	374.0	374.5	0.5
C	2,350	100	443	5.6	375.0	375.0	376.0	1.0
West Fork Plum Creek								
A	30	300	2,204	2.8	474.7	474.7	474.7	0.0
B	1,800	300	1,673	3.7	476.9	476.9	477.9	1.0
Little West Fork								
A[2]	400	395	1,952	3.2	477.9	477.9	478.9	1.0
B	1,400	358	999	3.9	479.7	479.7	480.5	0.8
C	2,440	250	1,020	3.8	482.8	482.8	483.6	0.8

[1] Feet above mouth for Little West Fork and Seals Creek Tributary; Feet above State Highway 20 for West Fork Plum Creek; Feet above U.S. Highway 90 for Seals Creek.

[2] Common floodway with Big West Fork.

[3] Elevation computed without consideration of backwater effects

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

FLOODWAY DATA

SEALS CREEK-SEALS CREEK TRIBUTARY-
WEST FORK PLUMB CREEK- LITTLE WEST FORK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Big West Fork								
A	1,460	80	400	8.7	480.7	480.7	481.0	0.3
B	2,700	200	910	3.8	485.6	485.6	486.2	0.6
C	4,980	335	1,250	2.5	494.5	494.5	495.3	0.8

[1] Feet above mouth.

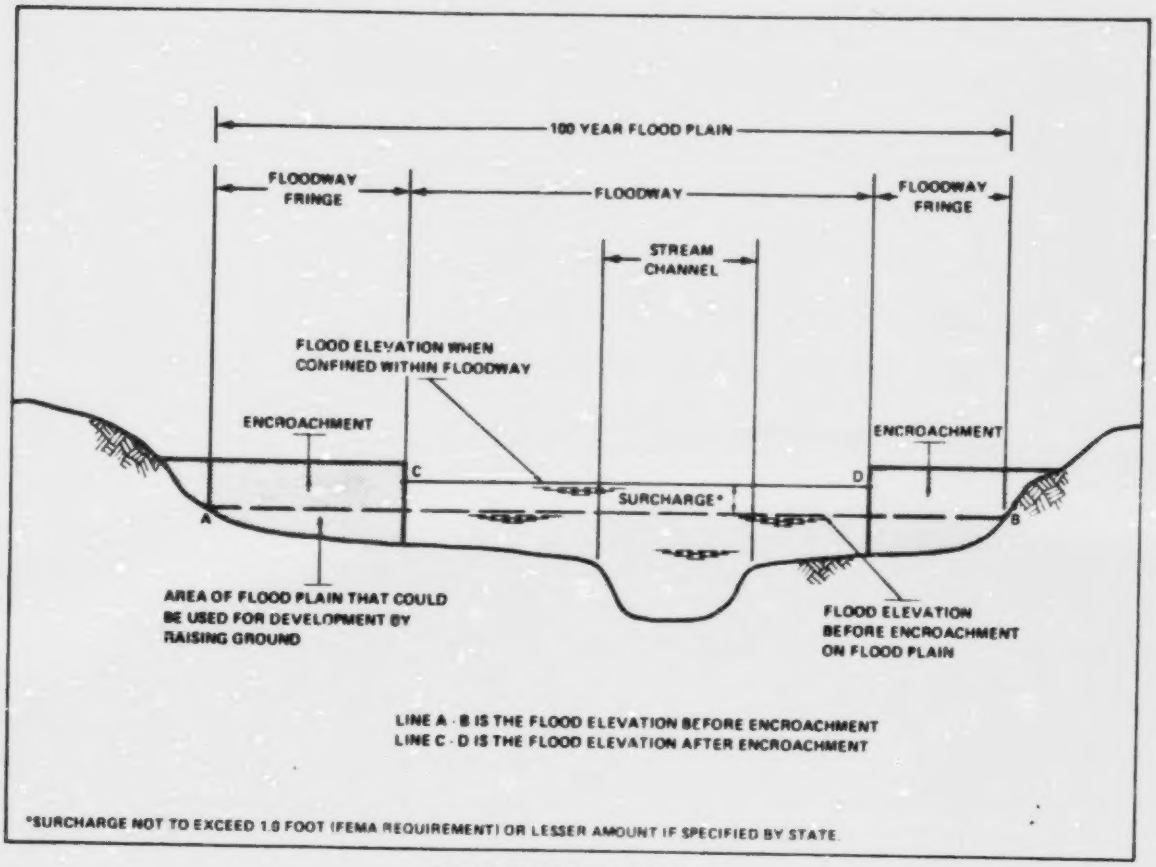
TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

FLOODWAY DATA

BIG WEST FORK


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 8

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting Caldwell County.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

Two reaches meeting the above criteria were established for the San Marcos River. The other creeks studied in Caldwell County resulted in the following breakdown: one reach for Seals Creek, two reaches for the Tributary to Seals Creek, three reaches for Tenney Creek, three reaches for Campbell Creek, one reach for West Fork to Plum Creek and its two branches, and four reaches for the Unnamed Tributary to the San Marcos River. The designations and locations of the reaches area shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors (FHFs)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference between the water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire study area of Caldwell County was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations.

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A2,A3,A4,A5, A7, A12,A14, A16,A18,A22, A23, and A26:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF's.

Zone AH:	Special Flood Hazard Areas inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; base flood elevations are shown, but no Flood Hazard Factors are determined.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 4, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevation for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for Caldwell County is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

Another detailed Flood Insurance Study for the unincorporated areas of adjacent Guadalupe County, Texas included a study of the San Marcos River (Reference 10). Because flood elevations determined for the San Marcos River in the Guadalupe County report were not determined through use of step-backwater calculations, notable differences in these elevations were recognized when compared with the floodwater elevations determined in this current Caldwell County Flood Insurance Study. Floodways for the river were not determined in the Guadalupe County report.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND 10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)	FHF	ZONE	BASE FLOOD ELEVATION[3]
Tenney Creek							
Reach 1	0210	-1.60	-0.59	0.51	015	A3	Varies
Reach 2	0210	-2.51	-0.80	0.87	025	A5	Varies
Reach 3	0210	-1.02	-0.44	1.28	010	A2	Varies
Campbell Creek							
Reach 1	0210	-3.69	-1.15	0.59	035	A7	Varies
Reach 2	0210	-5.98	-2.33	0.16	060	A12	Varies
Reach 3	0210,0230	-2.22	-0.92	0.58	020	A4	Varies
Seals Creek							
Reach 1	0320,0310	-1.28	-0.47	0.67	015	A3	Varies
Seals Creek Tributary							
Reach 1	0310	-1.26	-0.47	0.65	015	A3	Varies
Reach 2	0310	-0.88	-0.32	0.45	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT-SEE MAP

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

TENNY CREEK- CAMPBELL CREEK-
SEALS CREEK-SEALS CREEK TRIBUTARY

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
San Marcos River							
Reach 1	0340,0320	-12.35	-5.17	11.84	120	A22	Varies
Reach 2	0320,0315, 0305,0285, 0170,0165, 0155	- 7.95	-2.56	5.75	080	A16	Varies
Unnamed Tributary to San Marcos River							
Reach 1	0155	-13.11	-2.97	1.12	130	A23	Varies
Reach 2	0155,0165	- 9.16	-3.10	2.44	090	A18	Varies
Reach 3	0165	-15.53	-9.28	2.42	160	A26	Varies
Reach 4	0165	- 7.05	-6.12	3.29	070	A14	Varies
Shallow Flooding Area							
Reach 1	0075,0155 0165	*	*	*	*	AH	Varies

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[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT-SEE MAP

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

SAN MARCOS RIVER-UNNAMED TRIBUTARY TO SAN MARCOS RIVER-SHALLOW FLOODING AREA

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
West Fork Plum Creek							
Reach 1	0180	-1.02	-0.31	0.55	010	A2	Varies
Little West Fork							
Reach 1	0180	-0.75	-0.22	0.41	010	A2	Varies
Big West Fork							
Reach 1	0180	-0.81	-0.25	0.45	010	A2	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT-SEE MAP

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

FLOOD INSURANCE ZONE DATA

WEST FORK PLUM CREEK-LITTLE WEST FORK-BIG WEST FORK

Also, a study conducted by the SCS for the Lower Plum Creek Watershed (Reference 5) included both Tenney and Campbell Creeks. Although no backwater analyses were performed for these creeks as a part of this study, hydrologic and hydraulic computations were performed which resulted in the construction of floodwater retarding dam Sites No. 28 and No. 29 on Tenney Creek and Campbell Creek, respectively.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, Federal Center, Denton, Texas 76201.

8.0 BIBLIOGRAPHY AND REFERENCES

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5. U.S. Department of Agriculture, Soil Conservation Service, Work Plan for Watershed Protection and Flood Prevention, Lower Plum Creek Watershed, Hays and Caldwell Counties, Texas, August 1960, Supplemented February 1973.

6. U.S. Department of Agriculture, Soil Conservation Service, SCS National Engineering Handbook, Section 4, Hydrology, January 1971.

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10. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Guadalupe County, Texas (Unincorporated Areas), September 1, 1978.

11. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Computer Program 723-X6-L202A, HEC-2 Water-Surface Profiles, Davis, California, November 1976, with updates.

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TEXT REVISIONS
CALDWELL COUNTY, TEXAS

9.0 REVISION DESCRIPTION

9.1 Purpose

The purpose of this revision is to incorporate new and/or revised data into the currently effective Flood Insurance Study for Caldwell County, Texas. This Revision Description is intended to provide updated information which aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

9.2 Acknowledgments

The hydraulic data for this Addendum were performed by Travis Associates of Austin, Texas. The Federal Emergency Management Agency (FEMA) reviewed and accepted these data for purposes of this revision.

9.3 Scope

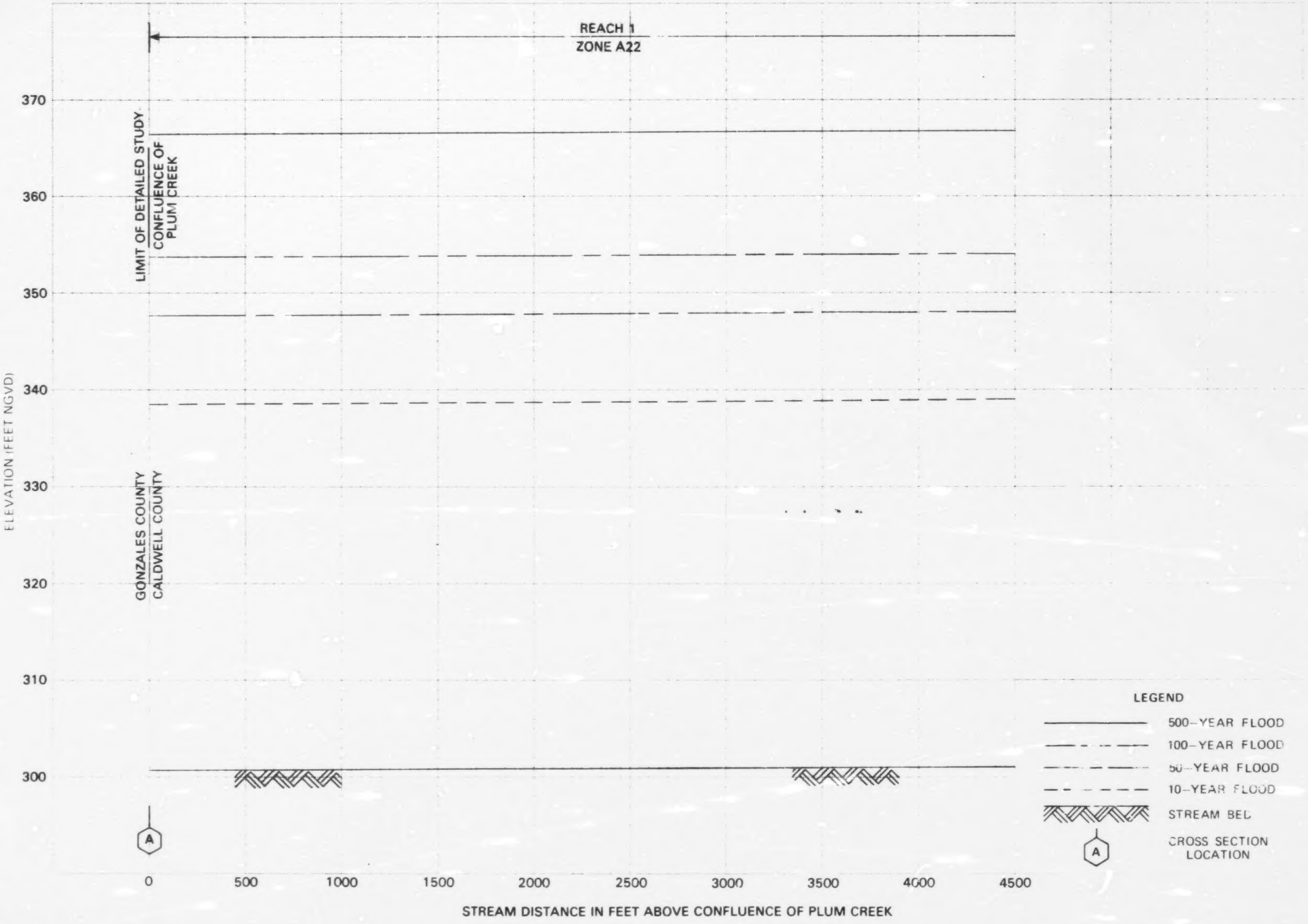
This revision reflects an alternate floodway configuration and revised flood elevations for the San Marcos River between cross sections V and X. The revision was based on updated topographic information. A Flood Insurance Rate Map (FIRM) panel (No. 155) and Flood Boundary and Floodway Map (FBFM) panels (Nos. 1 and 2) were revised to include the new detailed hydraulic data. Also, the recent incorporation of the Town of Martindale is reflected in this revision.

9.4 Hydrologic and Hydraulic Analyses

The hydraulic model for the San Marcos River was revised using more cross sections, different "n" values, and updated topographic information. The revised analysis affects panels 38 through 42 of the Flood Profiles.

9.5 Floodways

Floodway computations for the San Marcos River were revised as a result of new hydraulic data. The floodway was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations were tabulated at selected cross sections for the stream segment for which a floodway was revised and are presented in Table 3, "Floodway Data."



FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

01P

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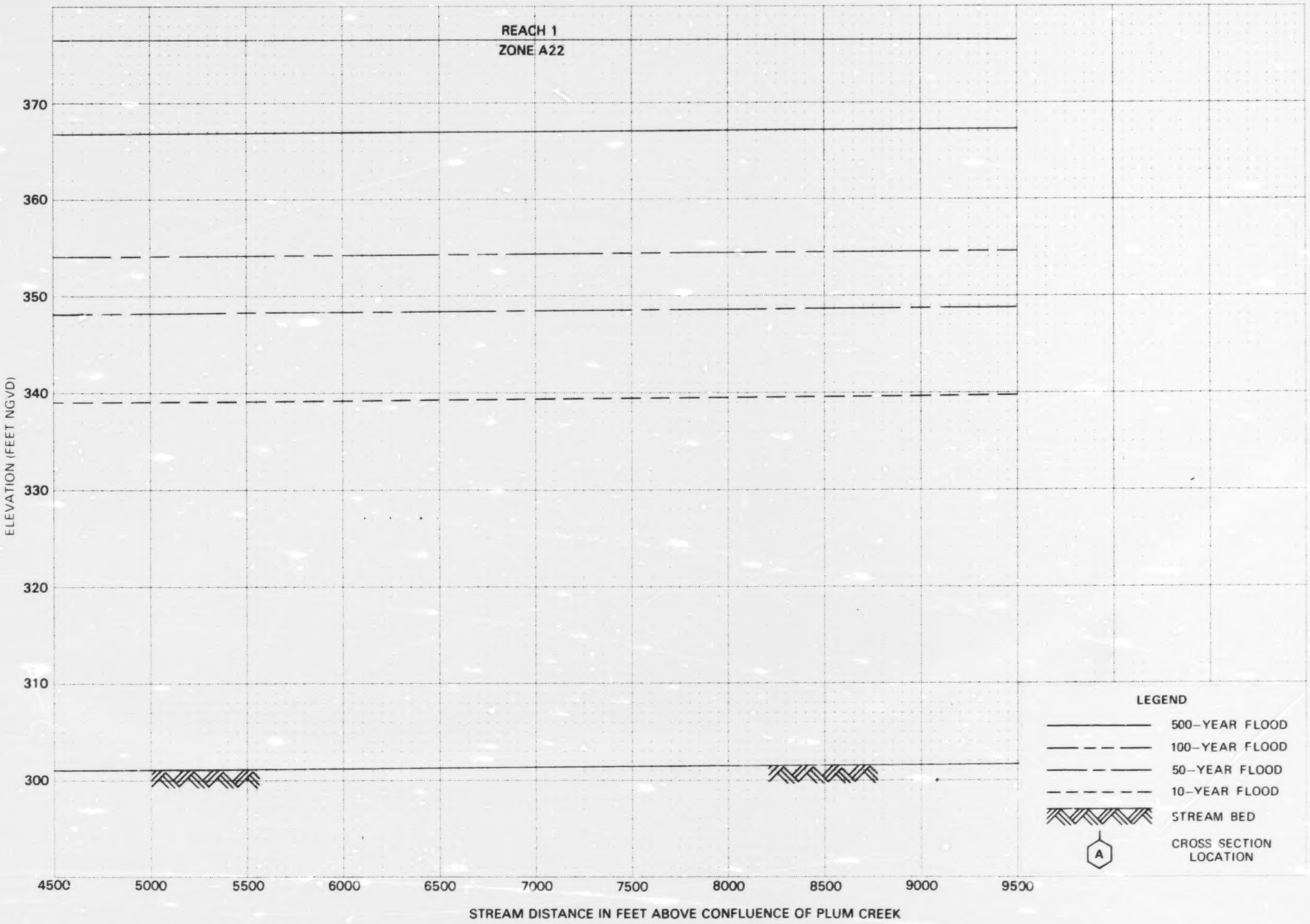


FLOOD PROFILES

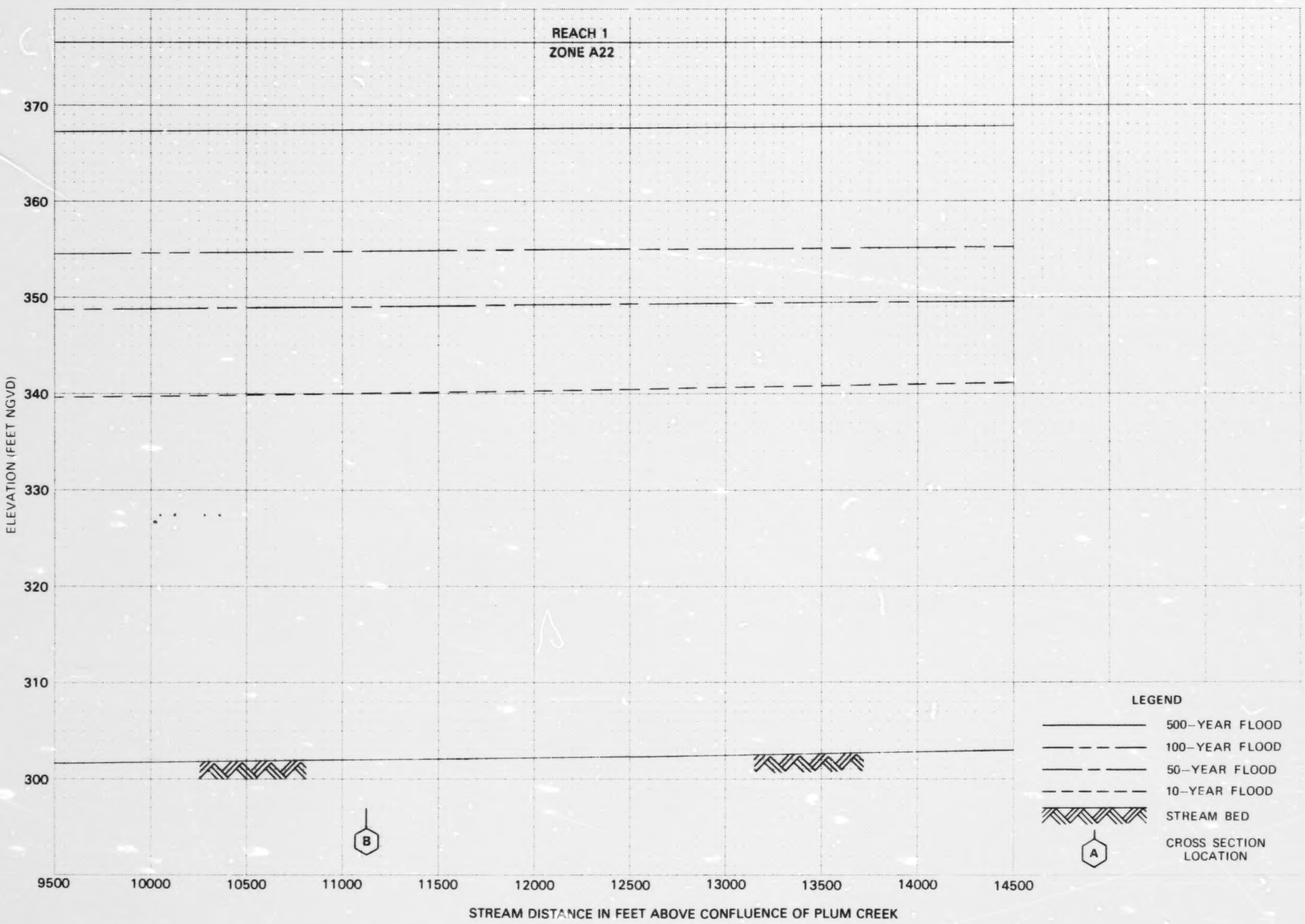
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

02P



FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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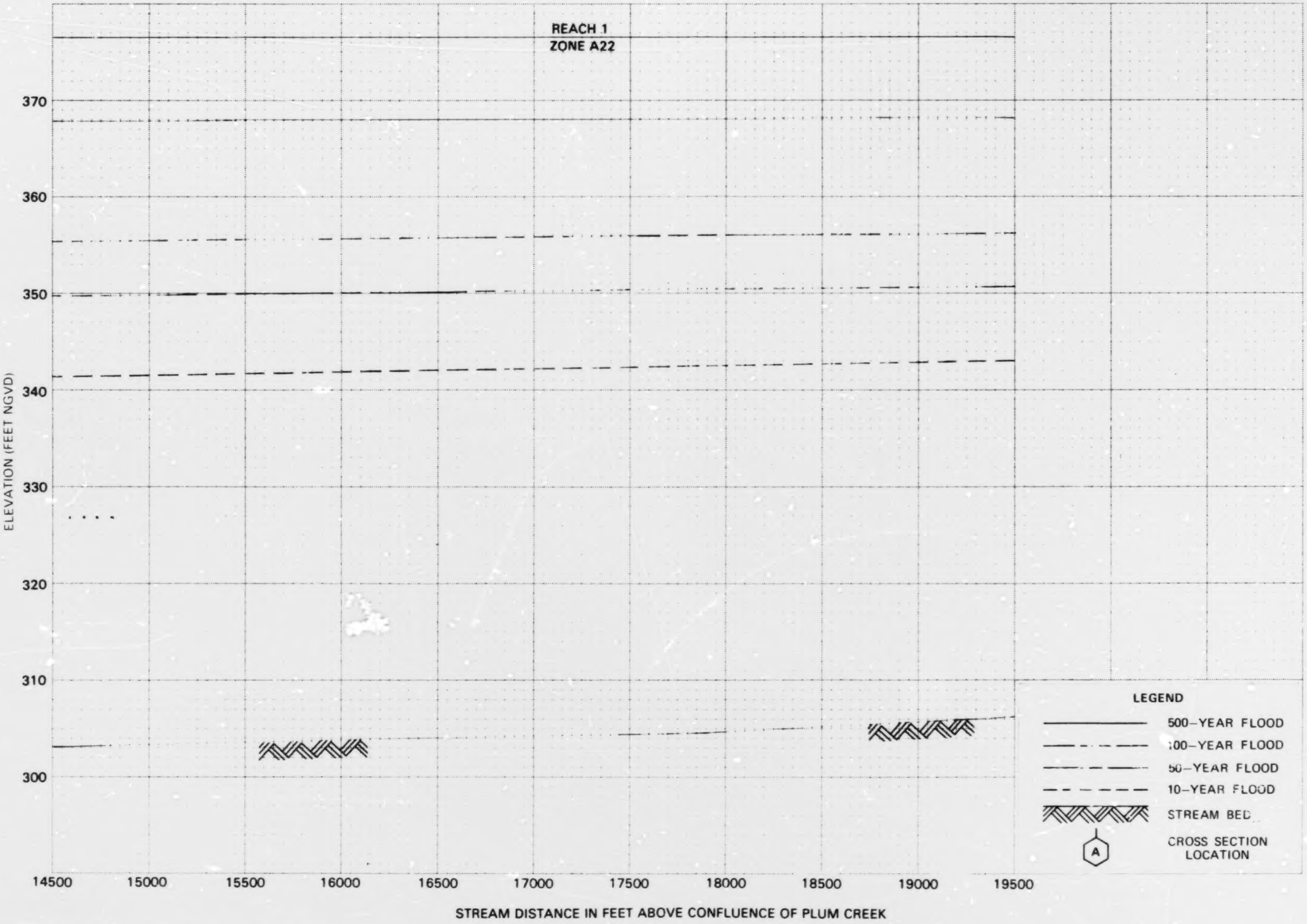

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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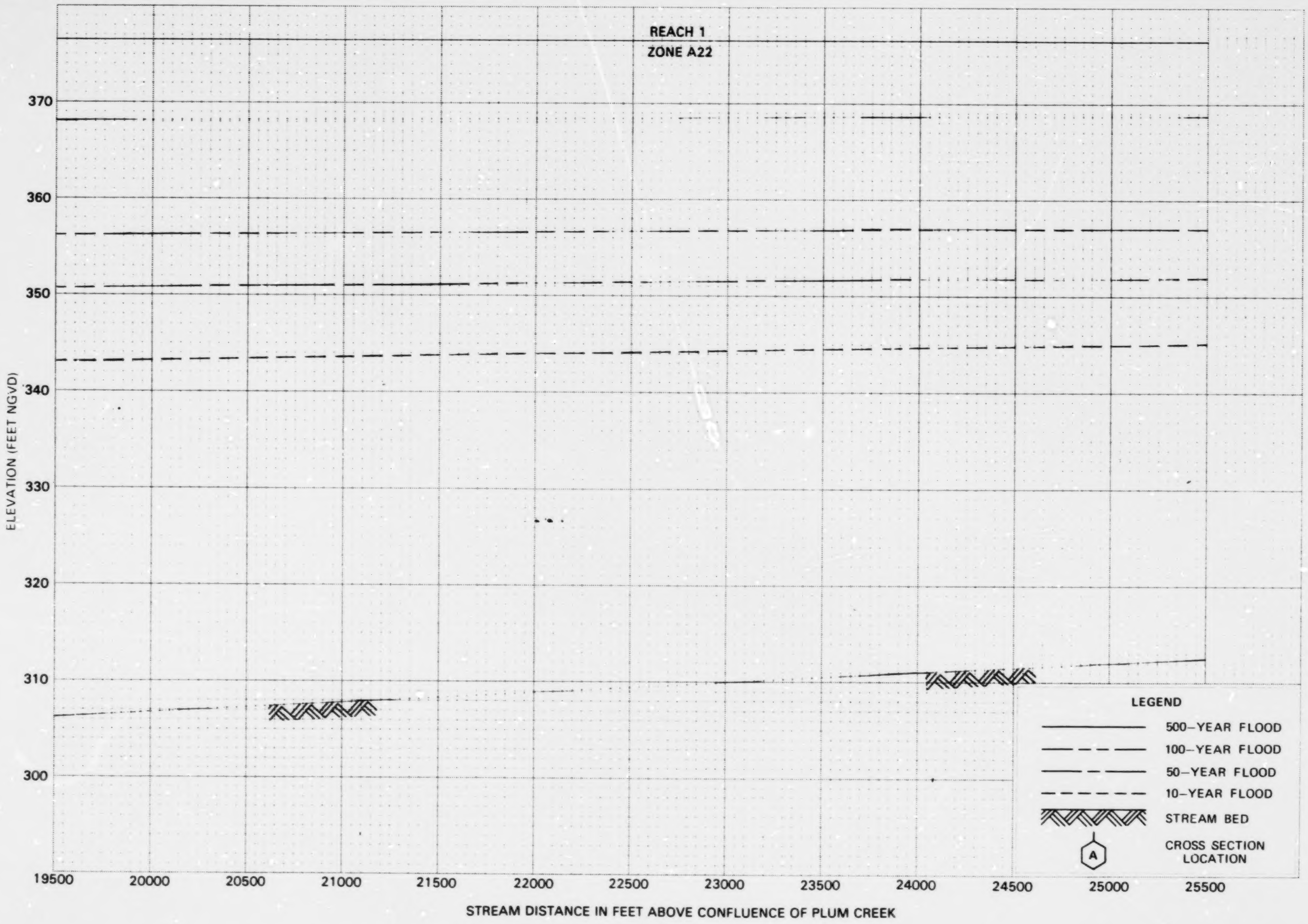

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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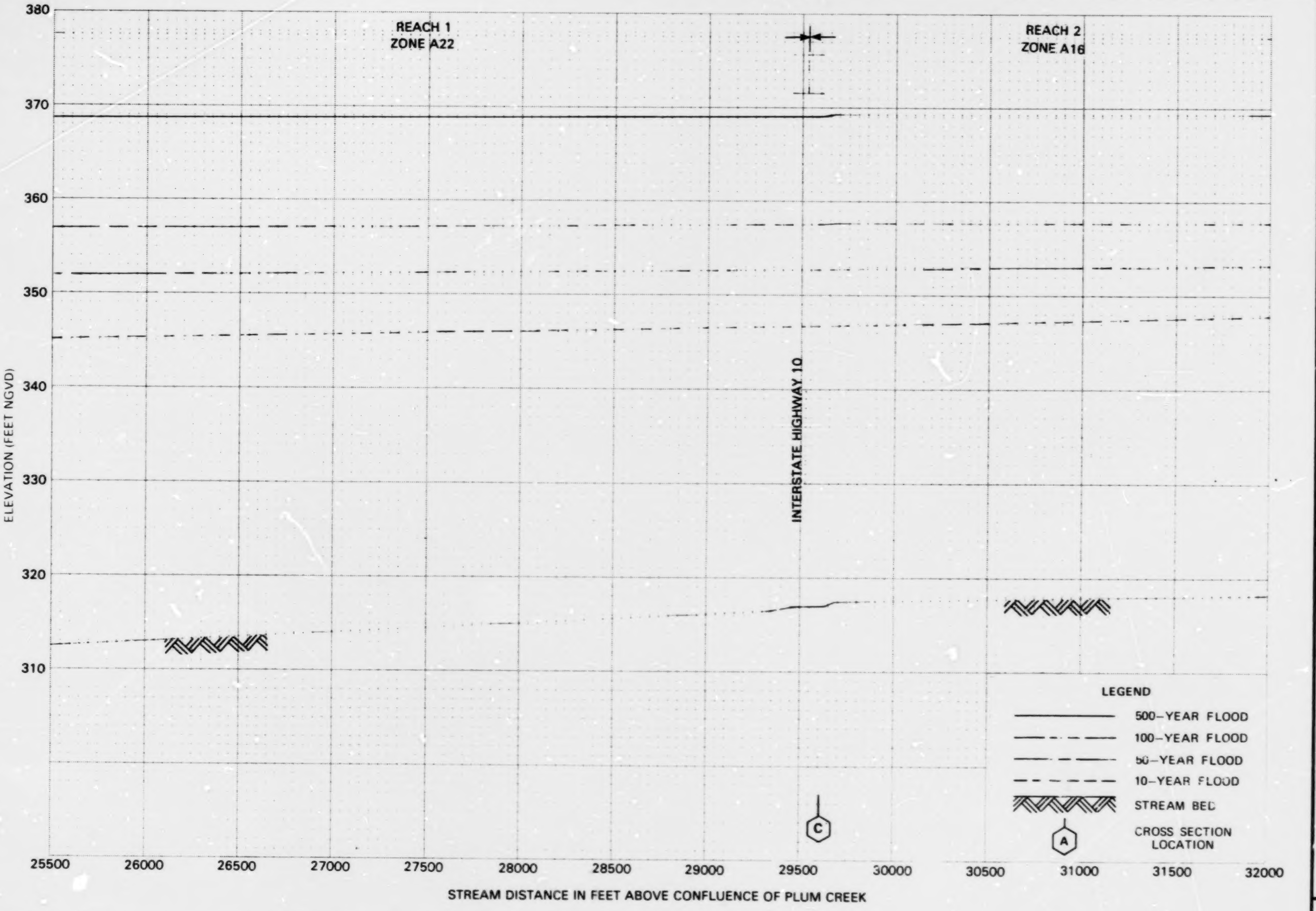

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

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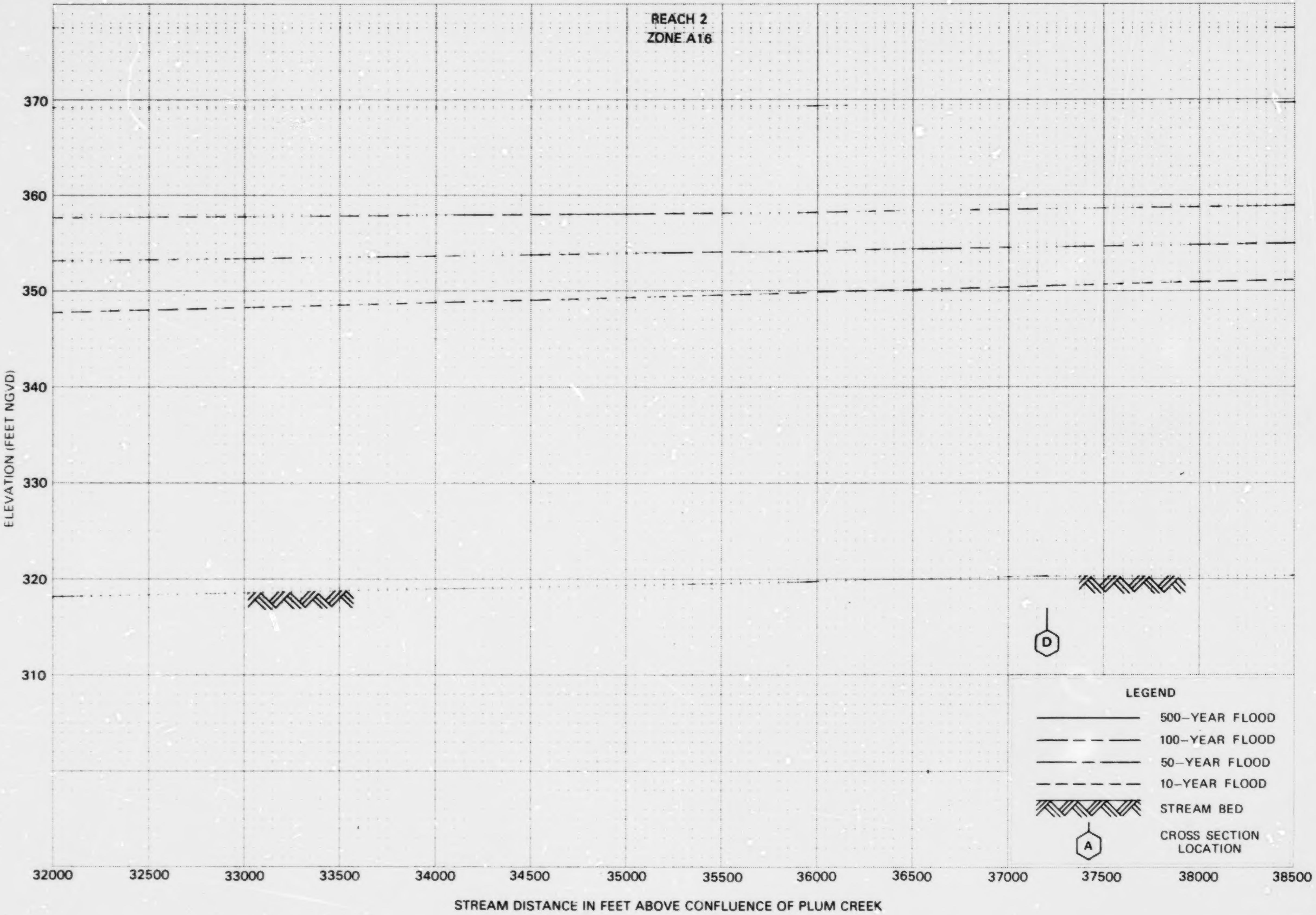

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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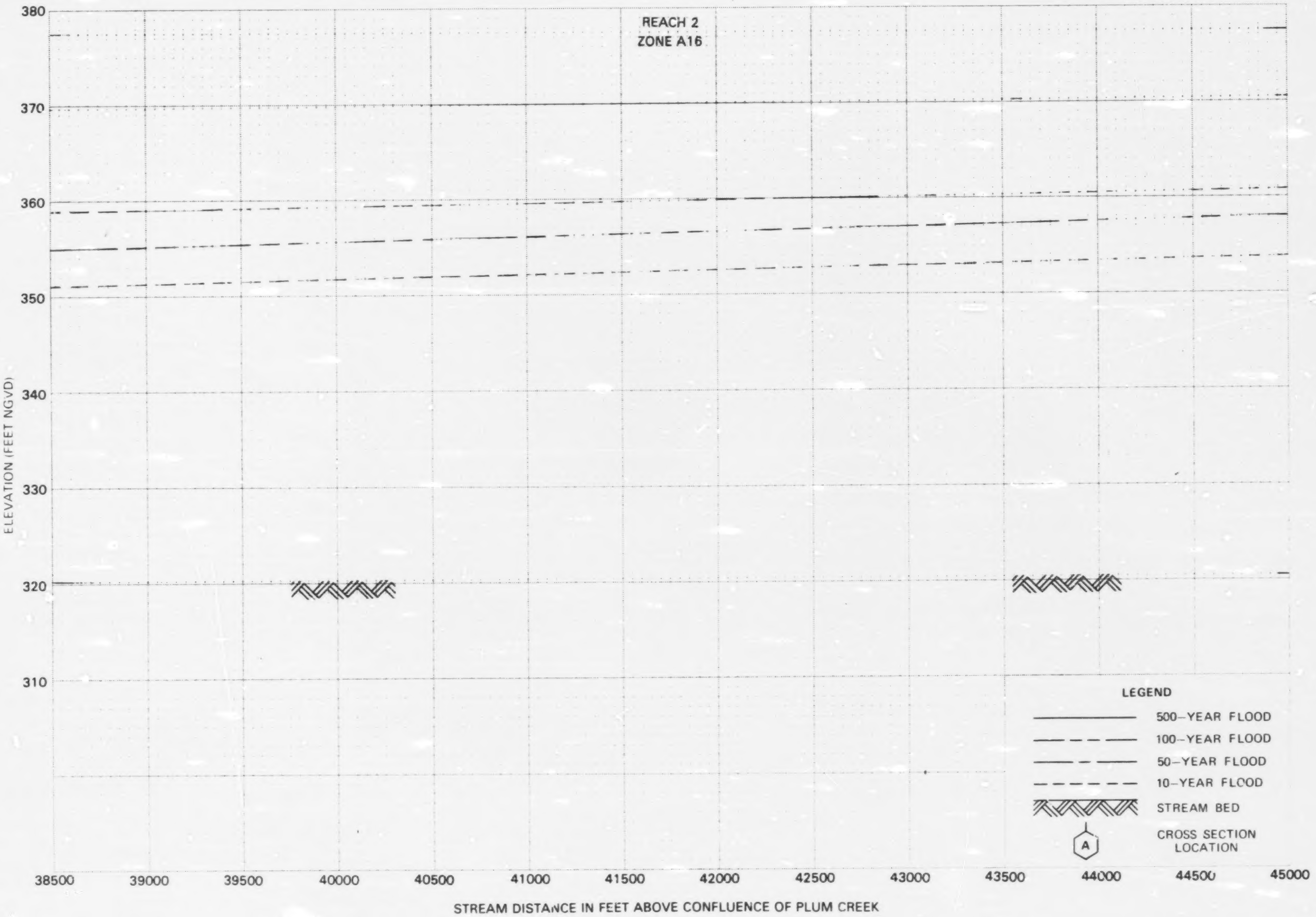

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

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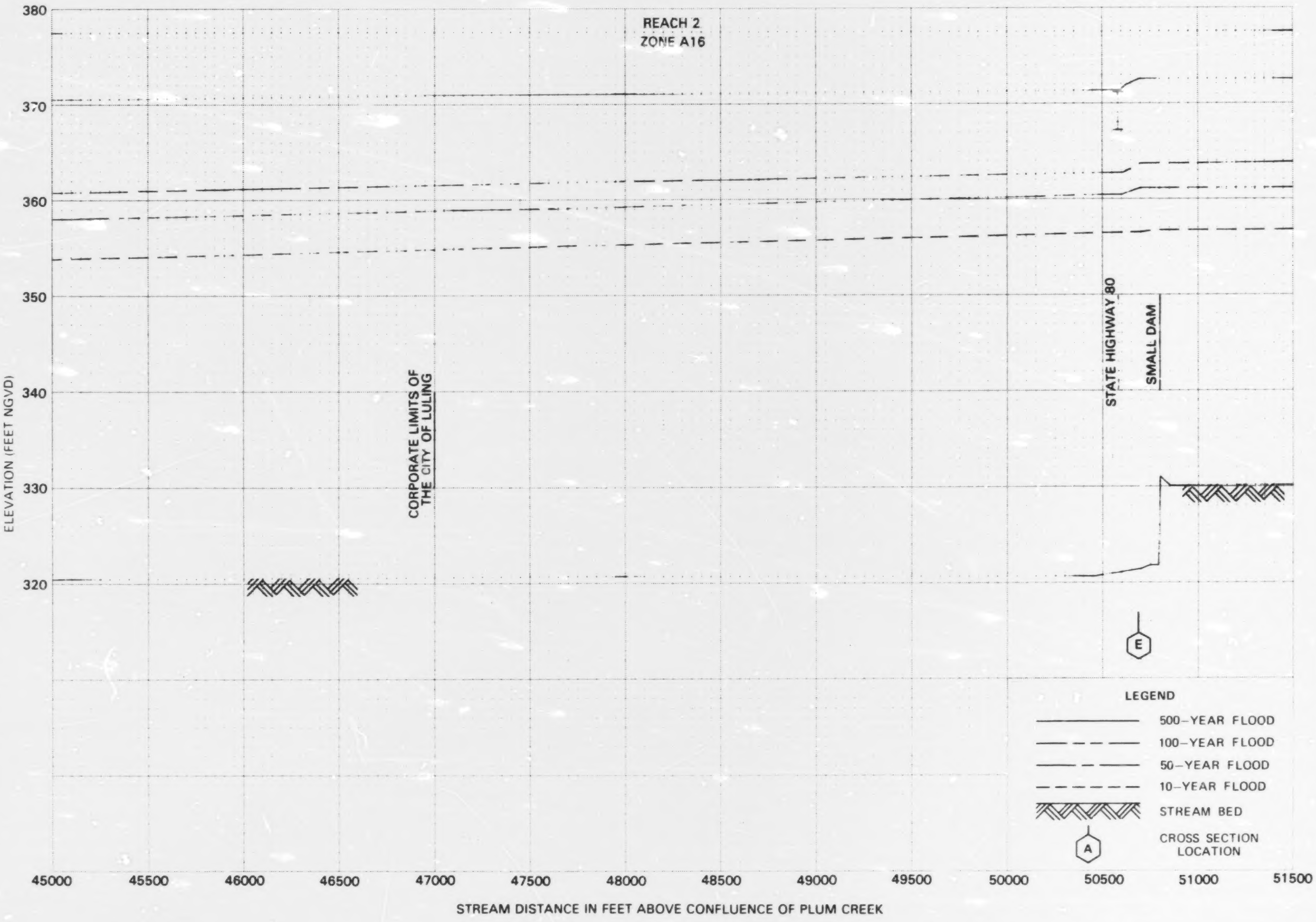

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

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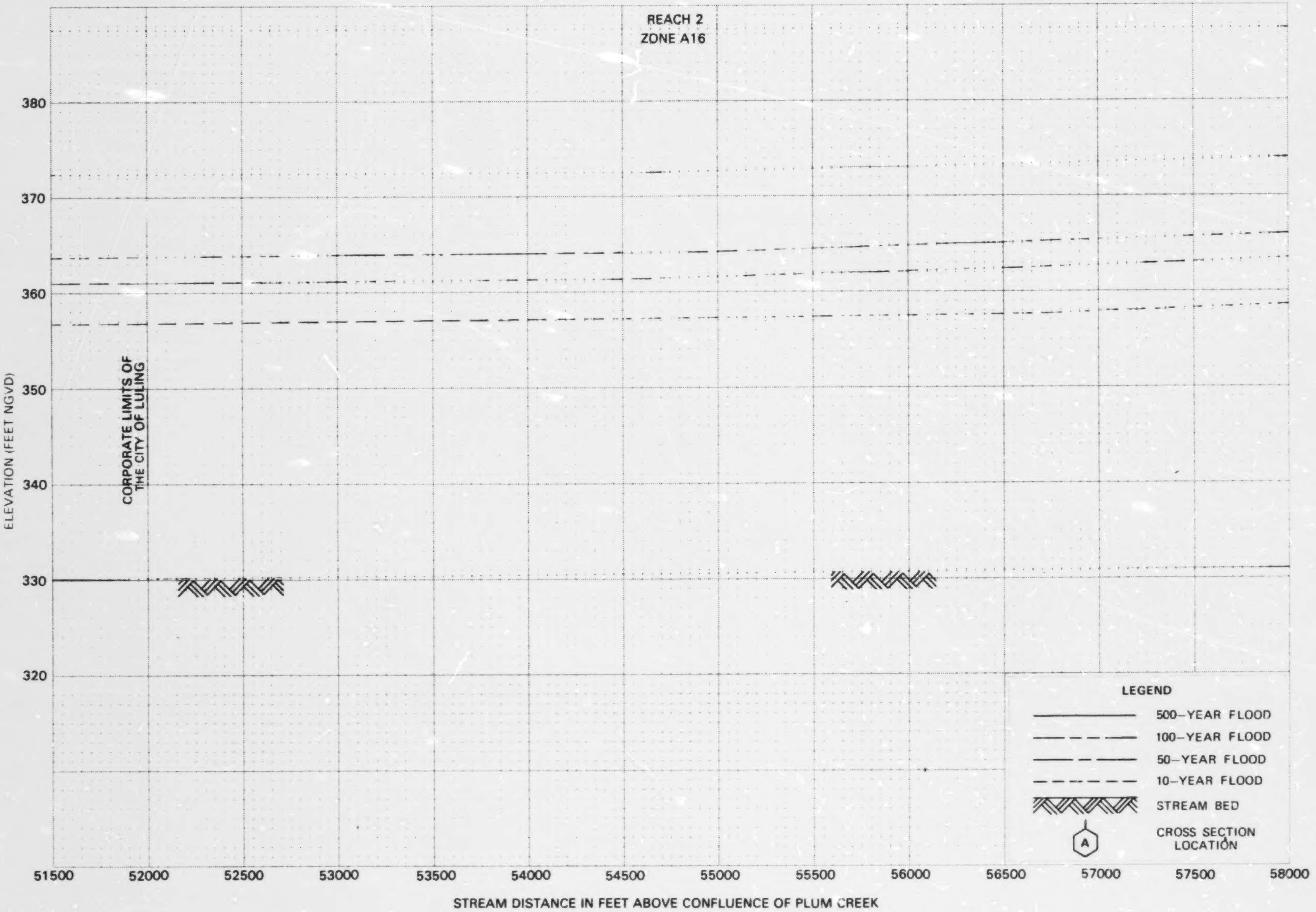

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

10P

38

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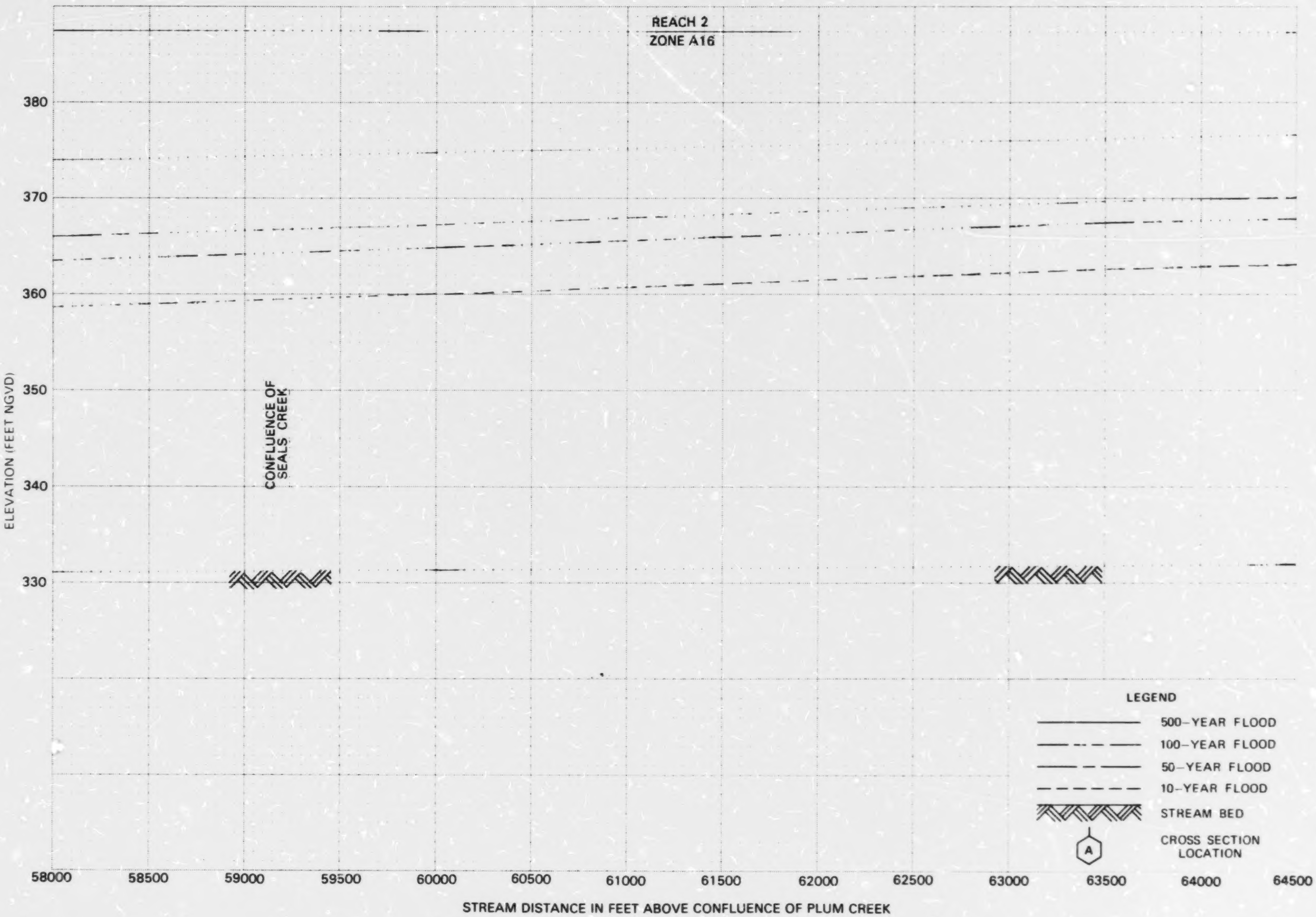

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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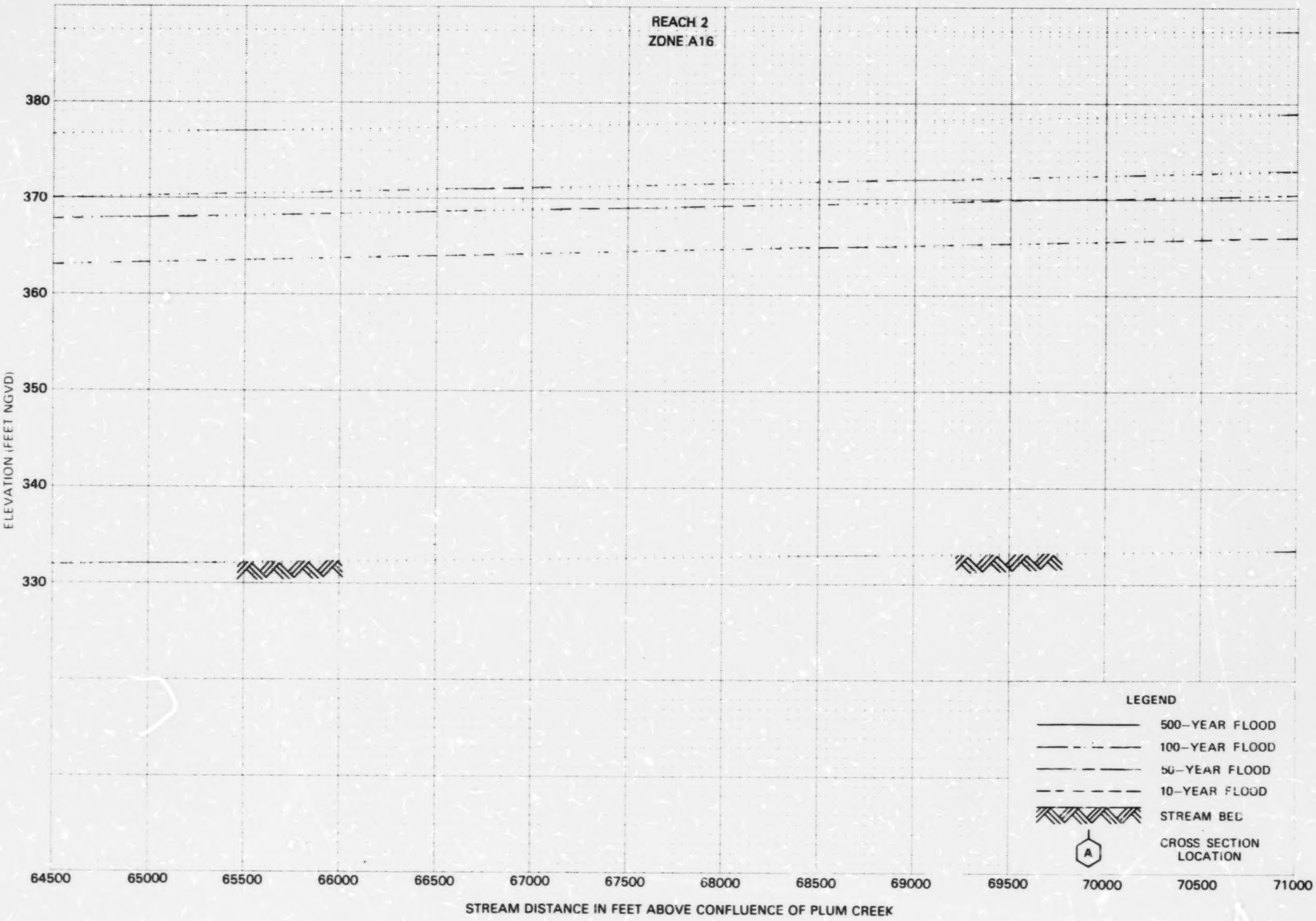

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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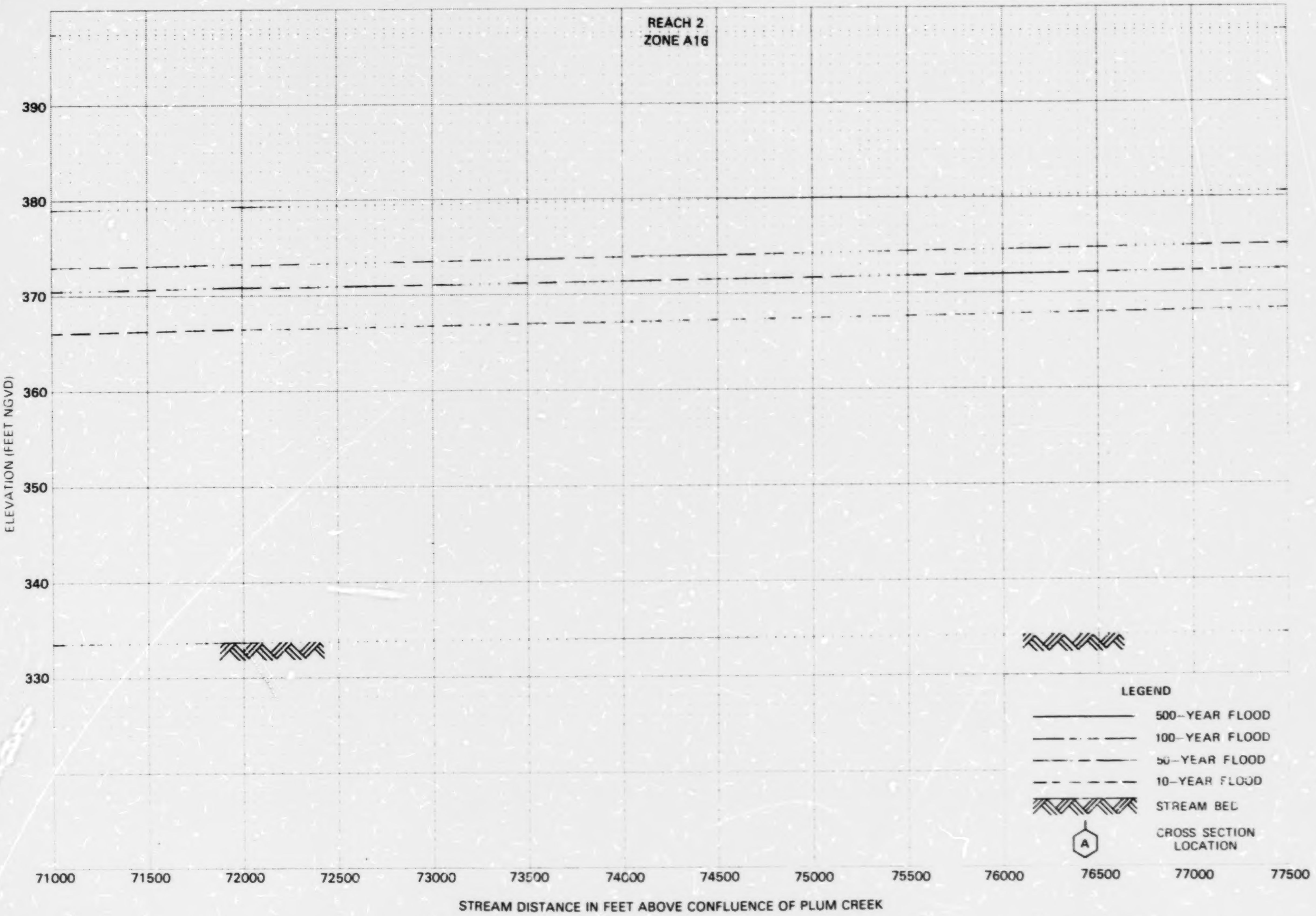


FLOOD PROFILES

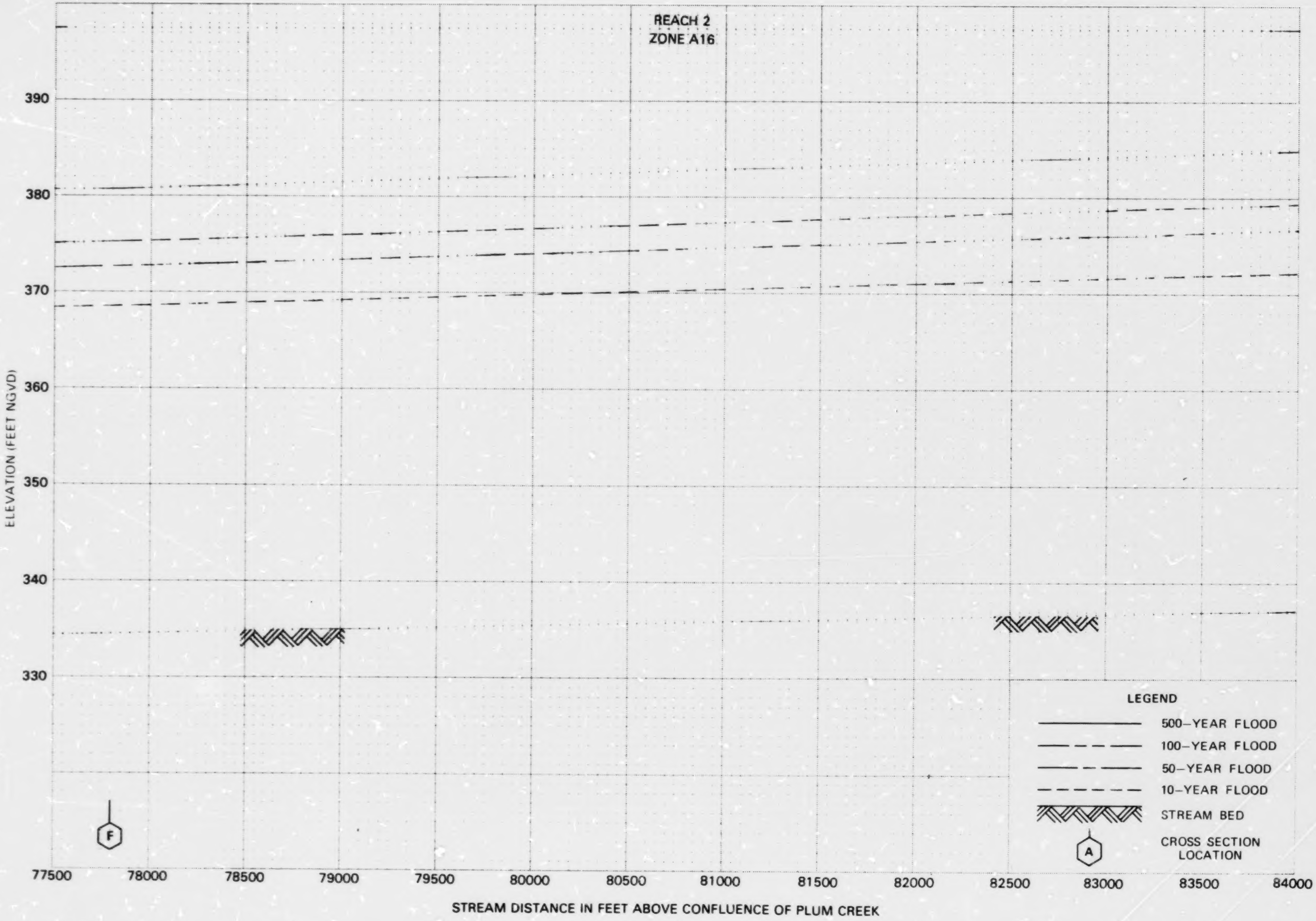
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

13P



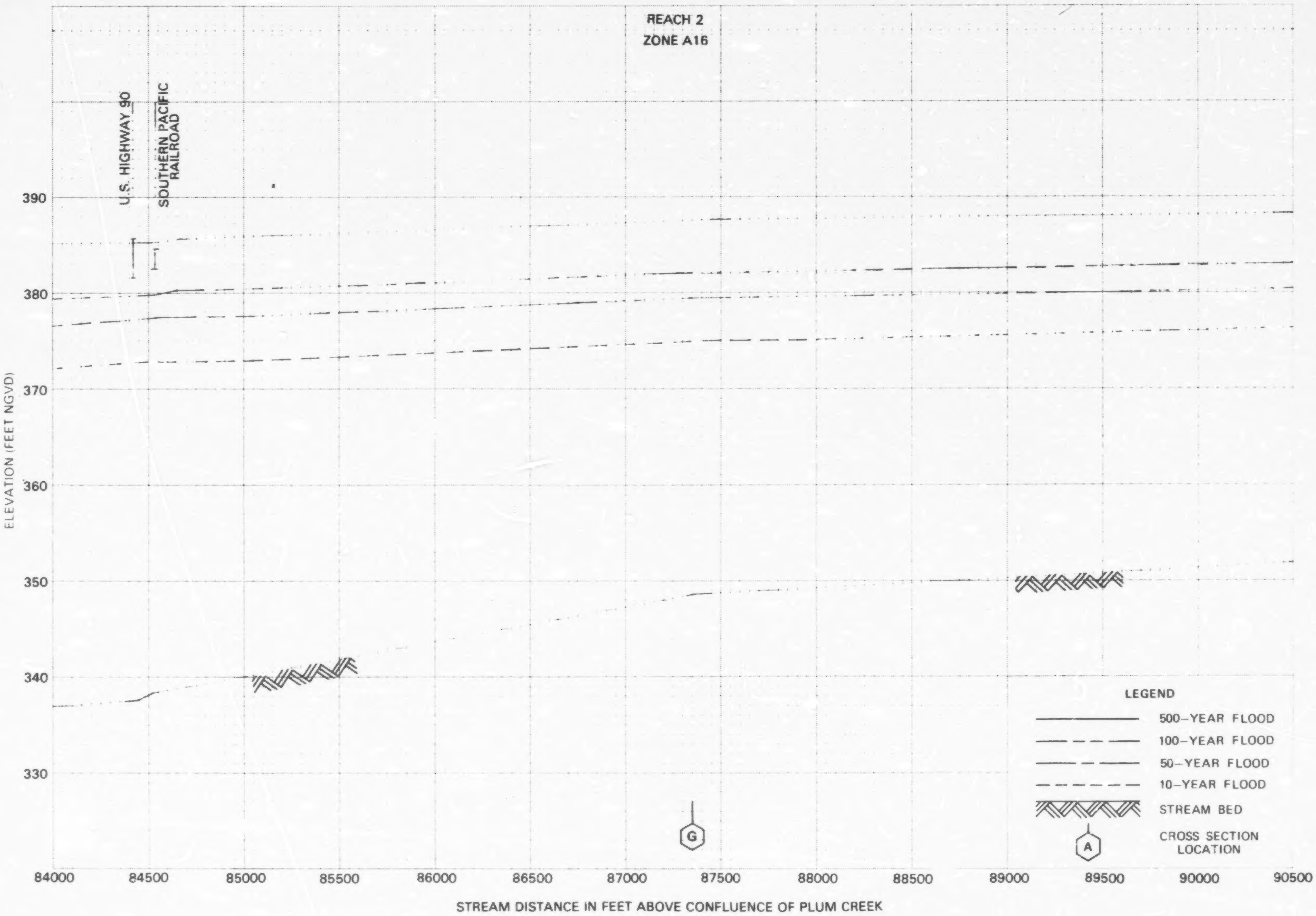
FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

14P



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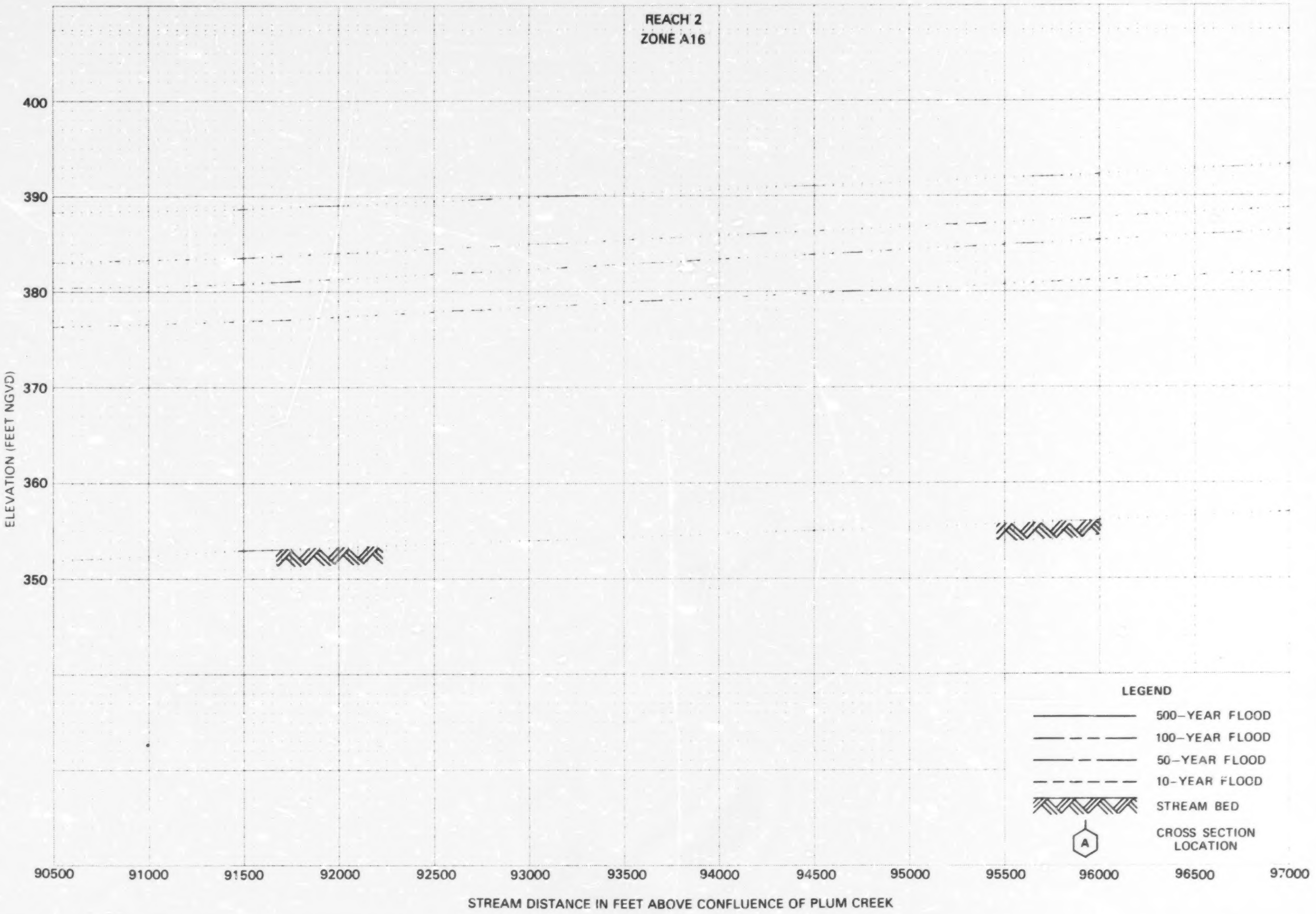
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

15P



FLOOD PROFILES

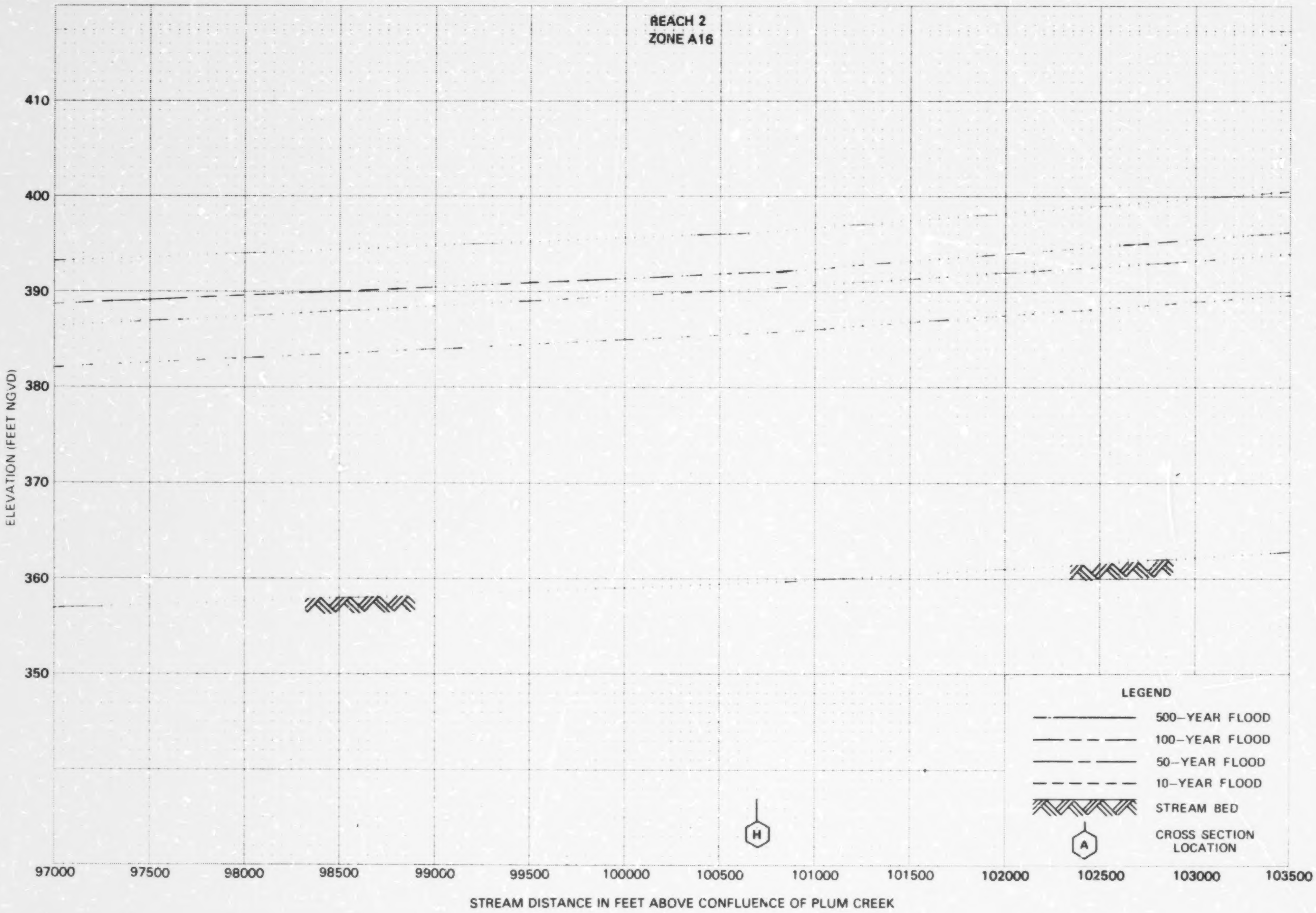
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

16P



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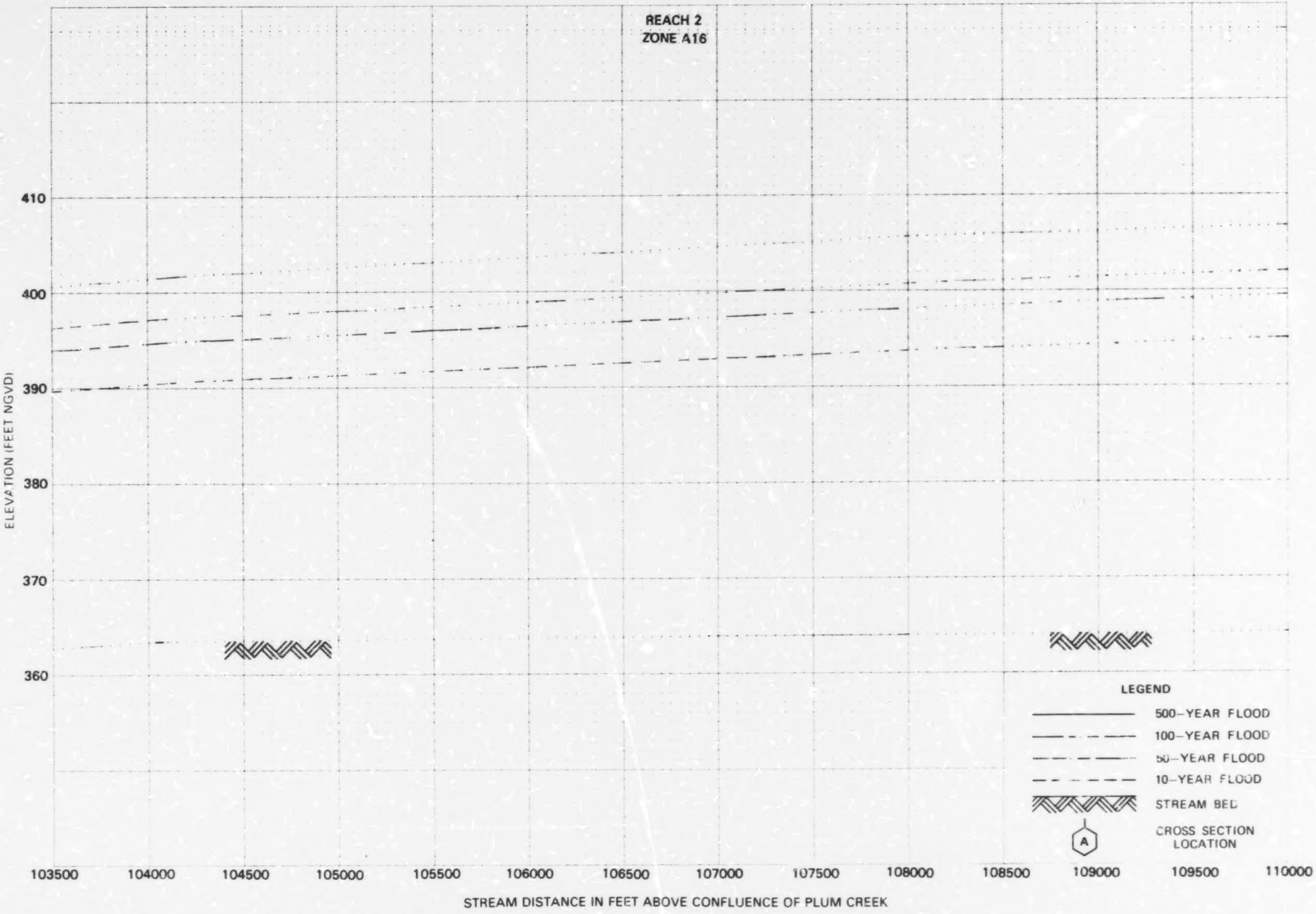
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

17P



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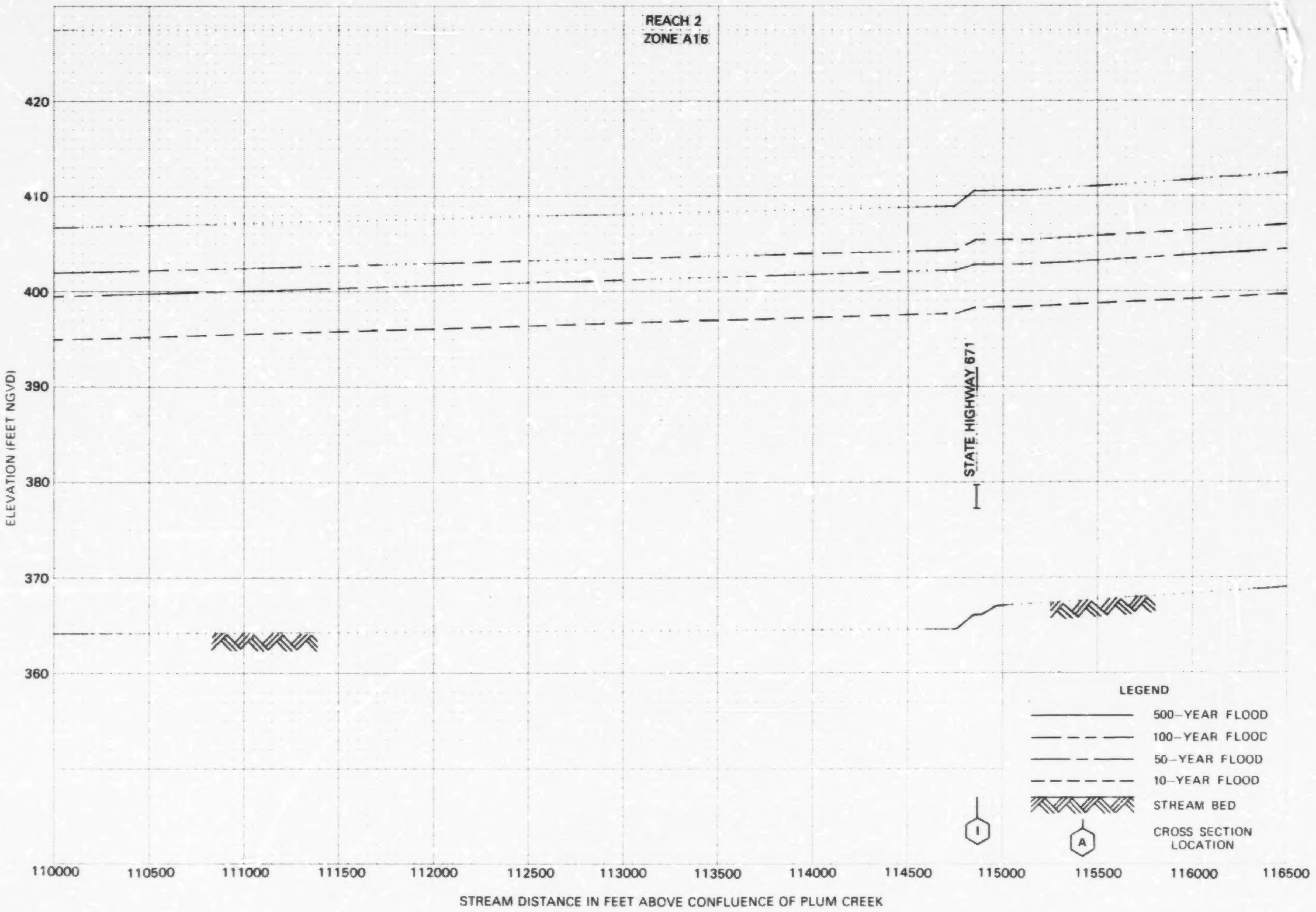
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

18P



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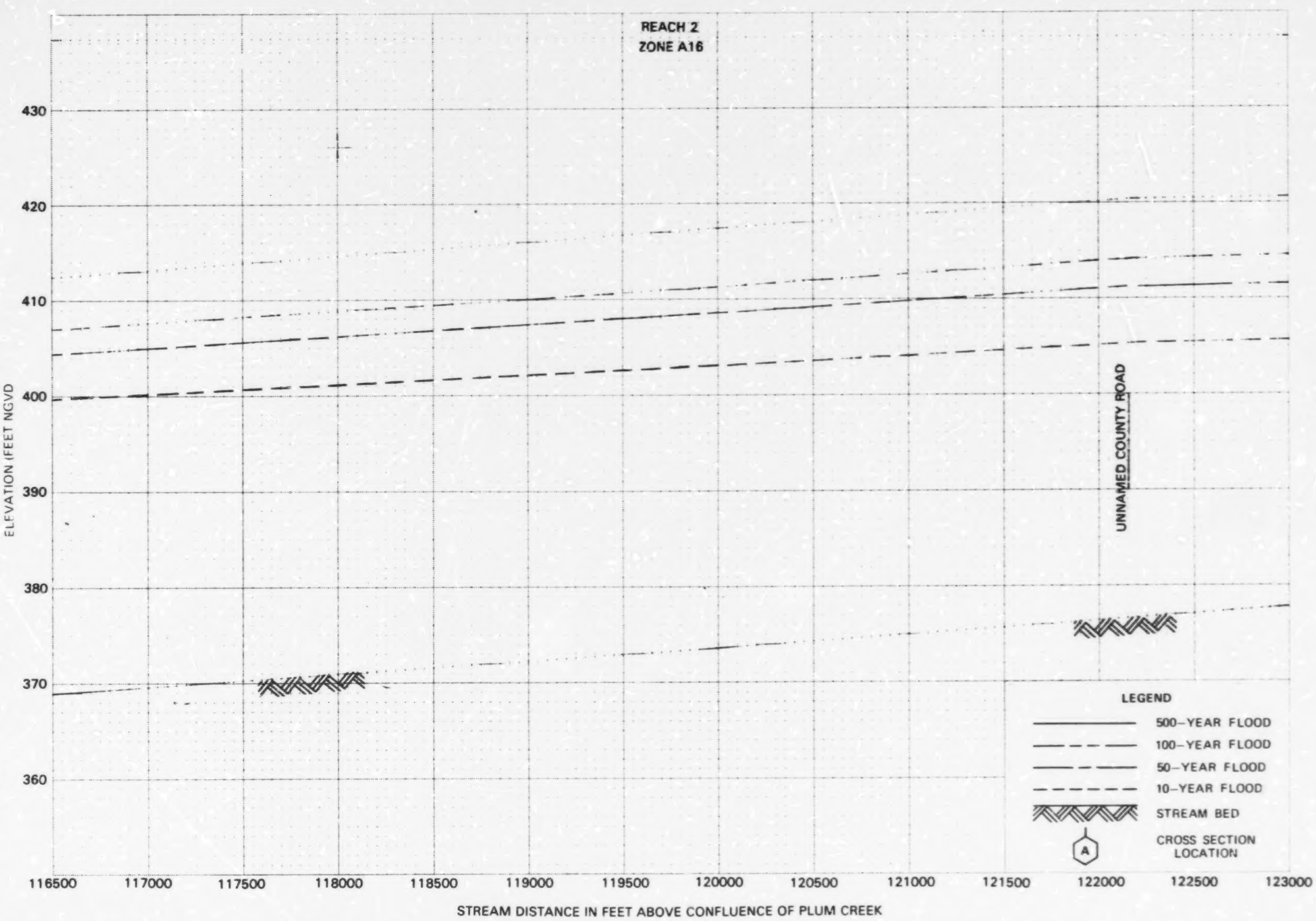
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

19P



FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

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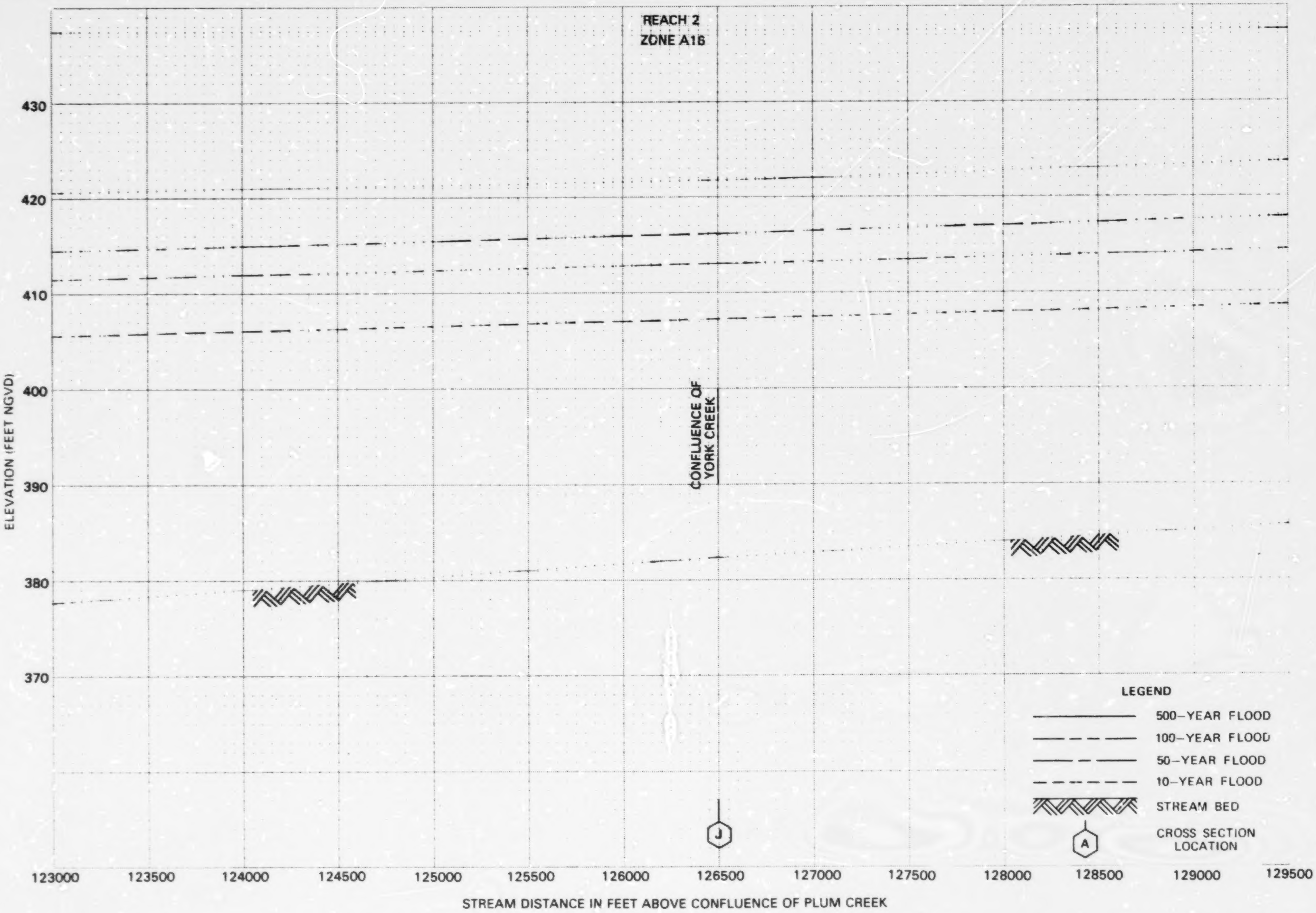

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

21P

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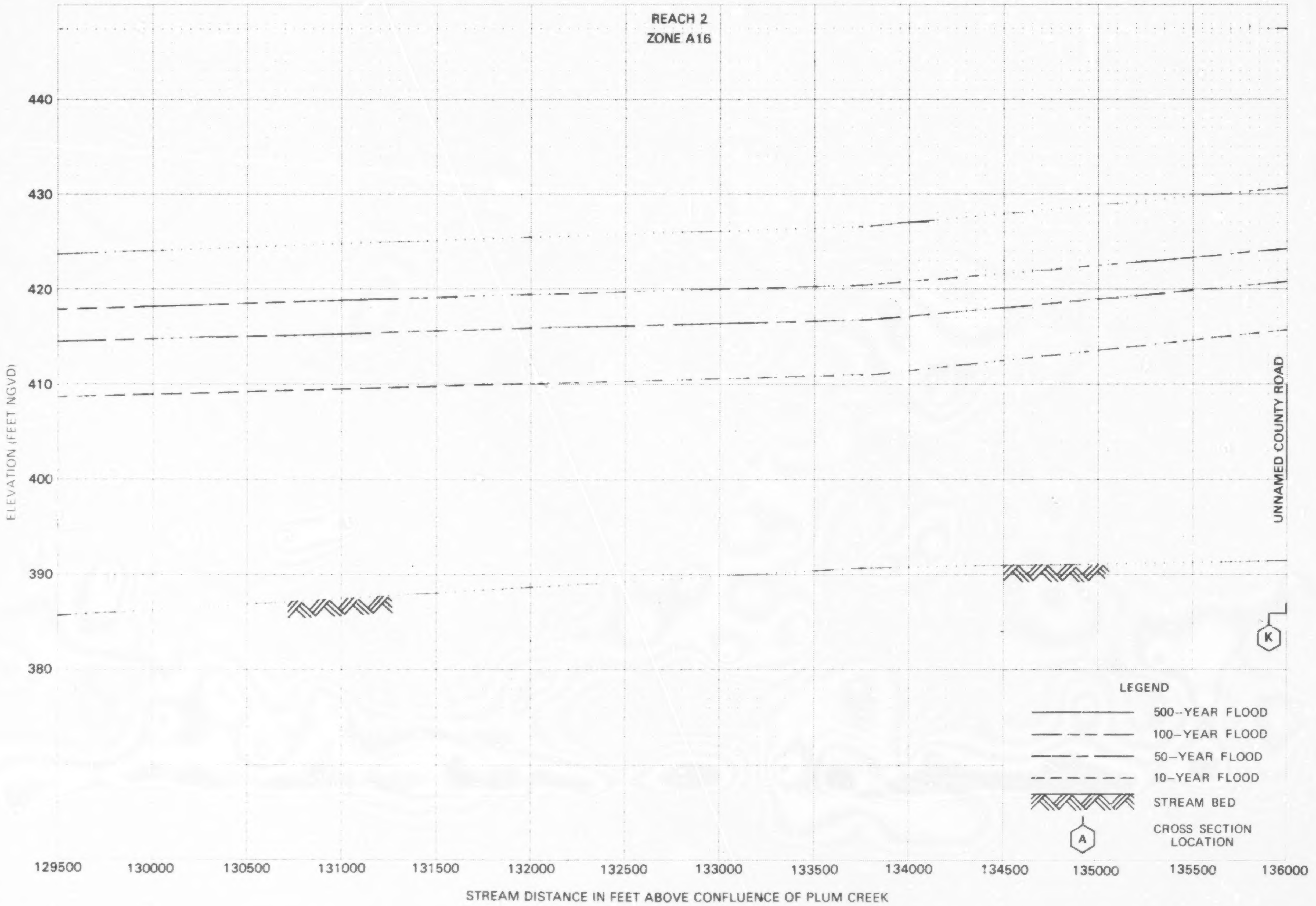


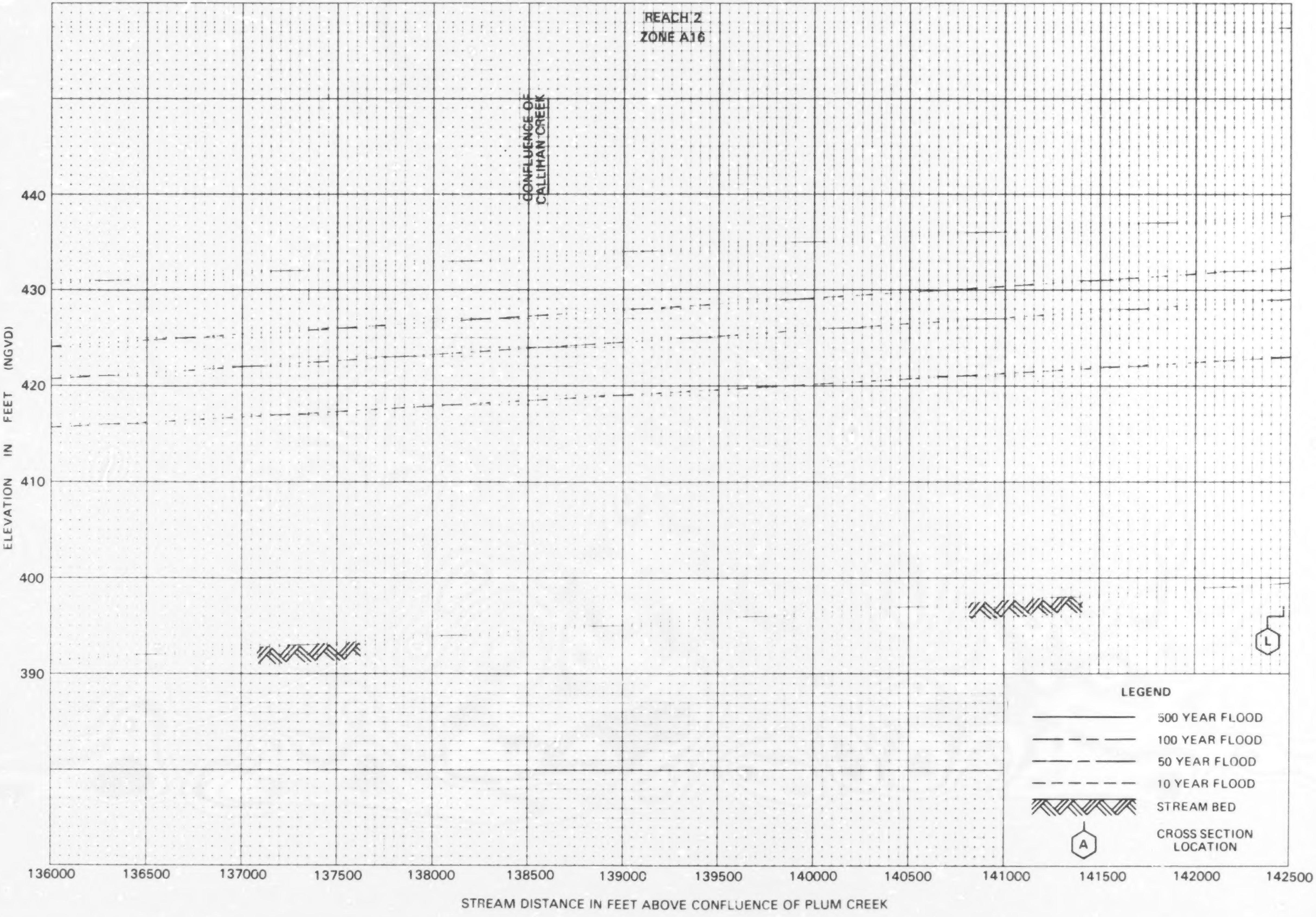
FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)



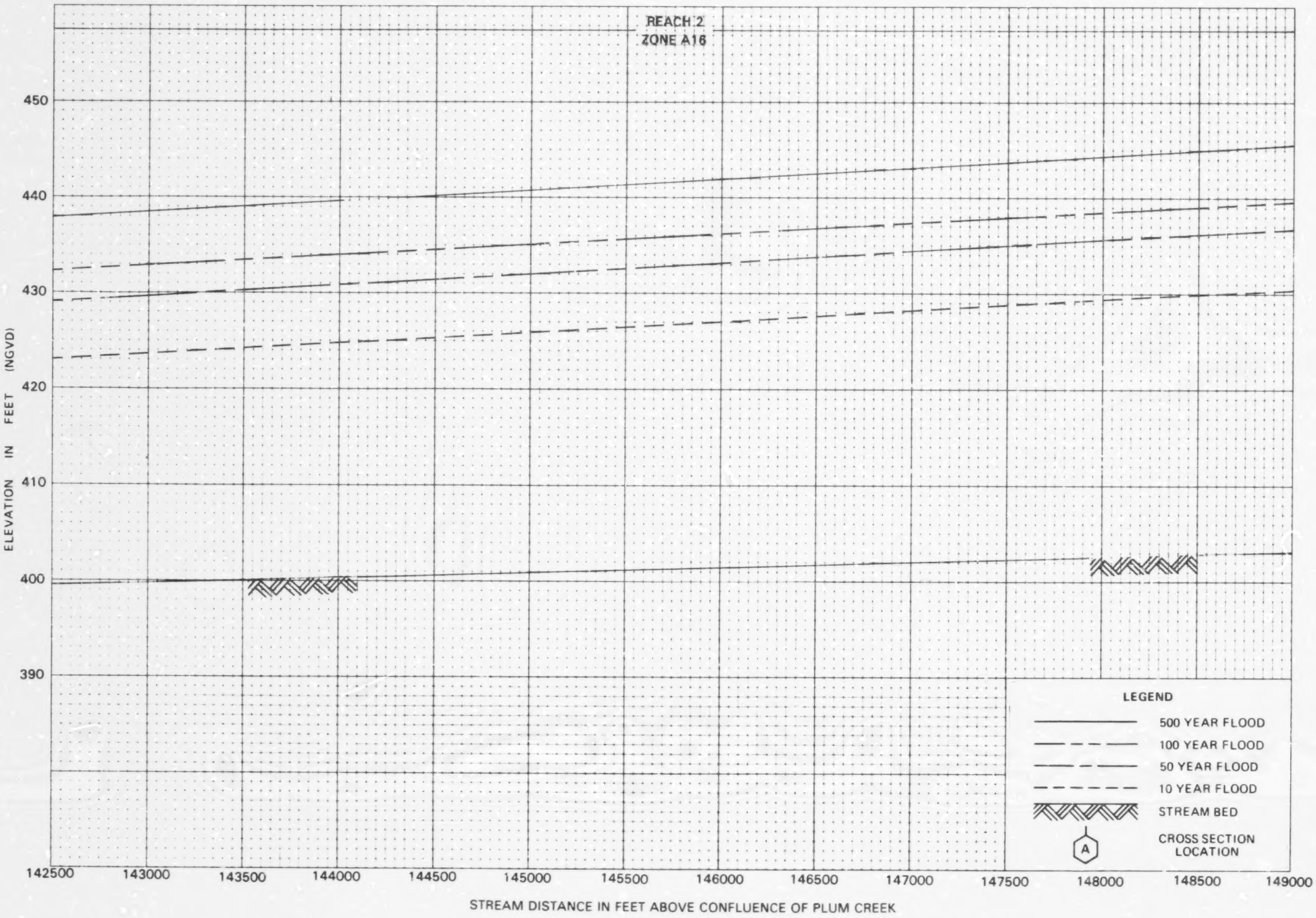
FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

23P

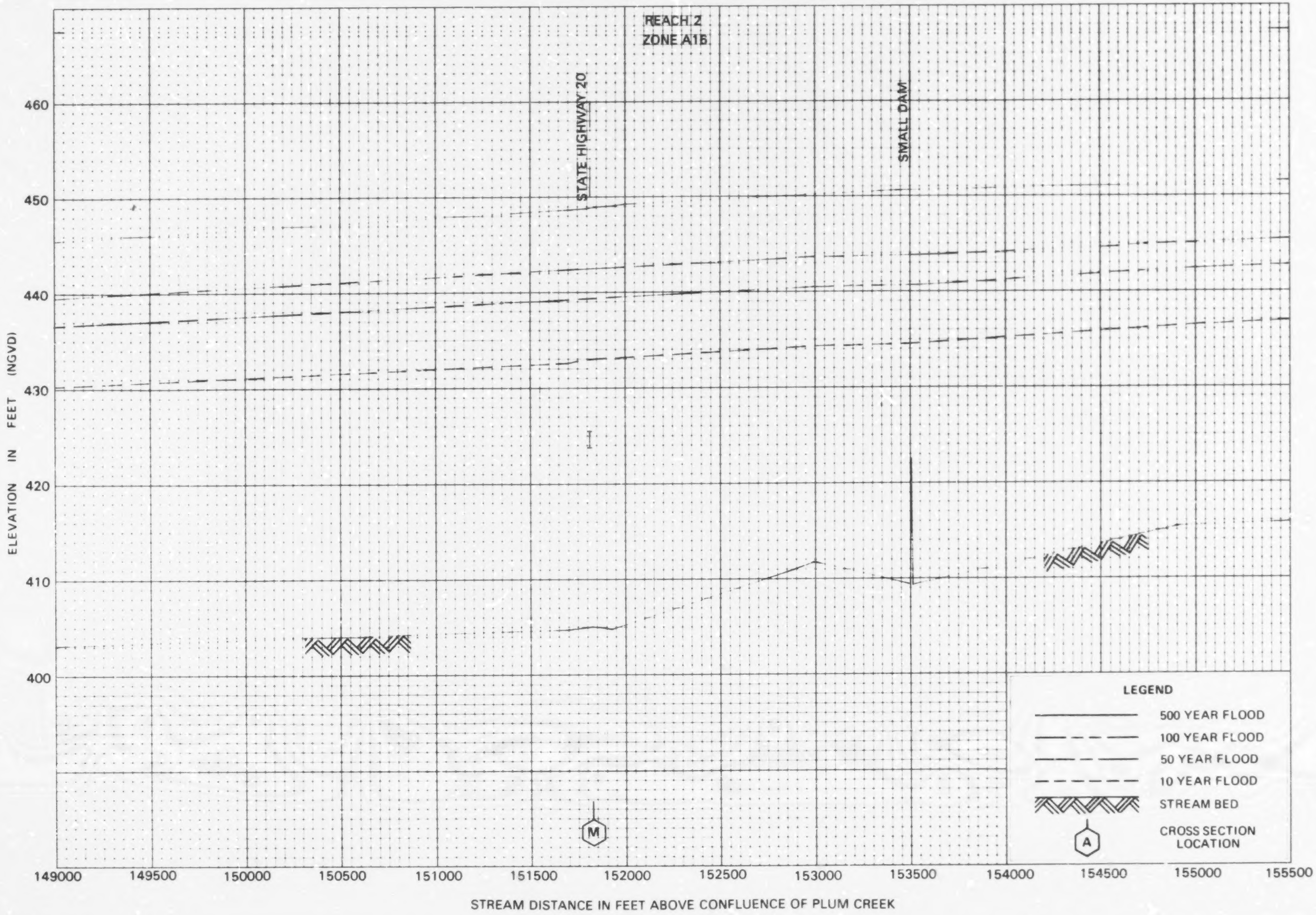


FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

FLOOD PROFILES

SAN MARCOS RIVER



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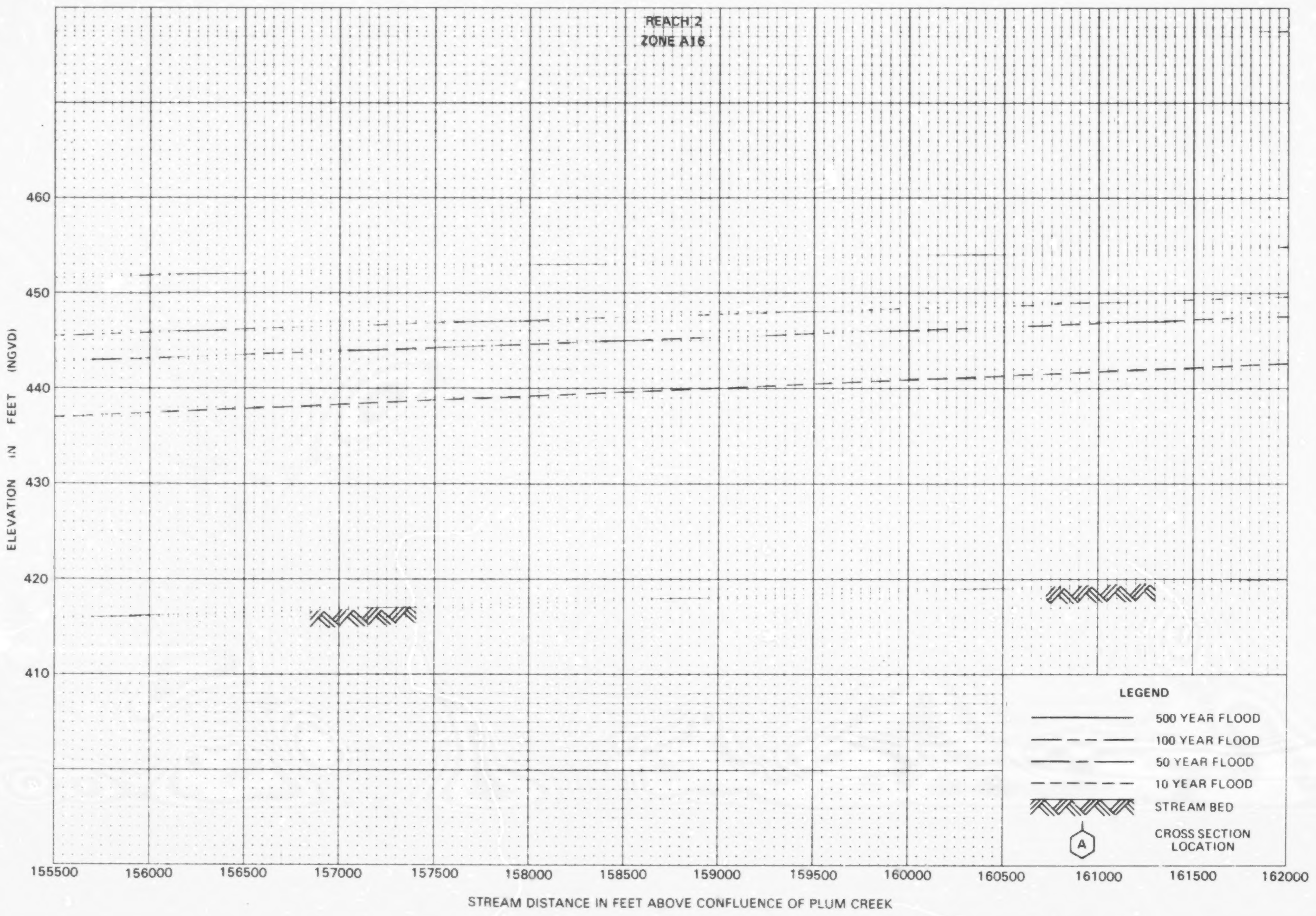
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)



FLOOD PROFILES

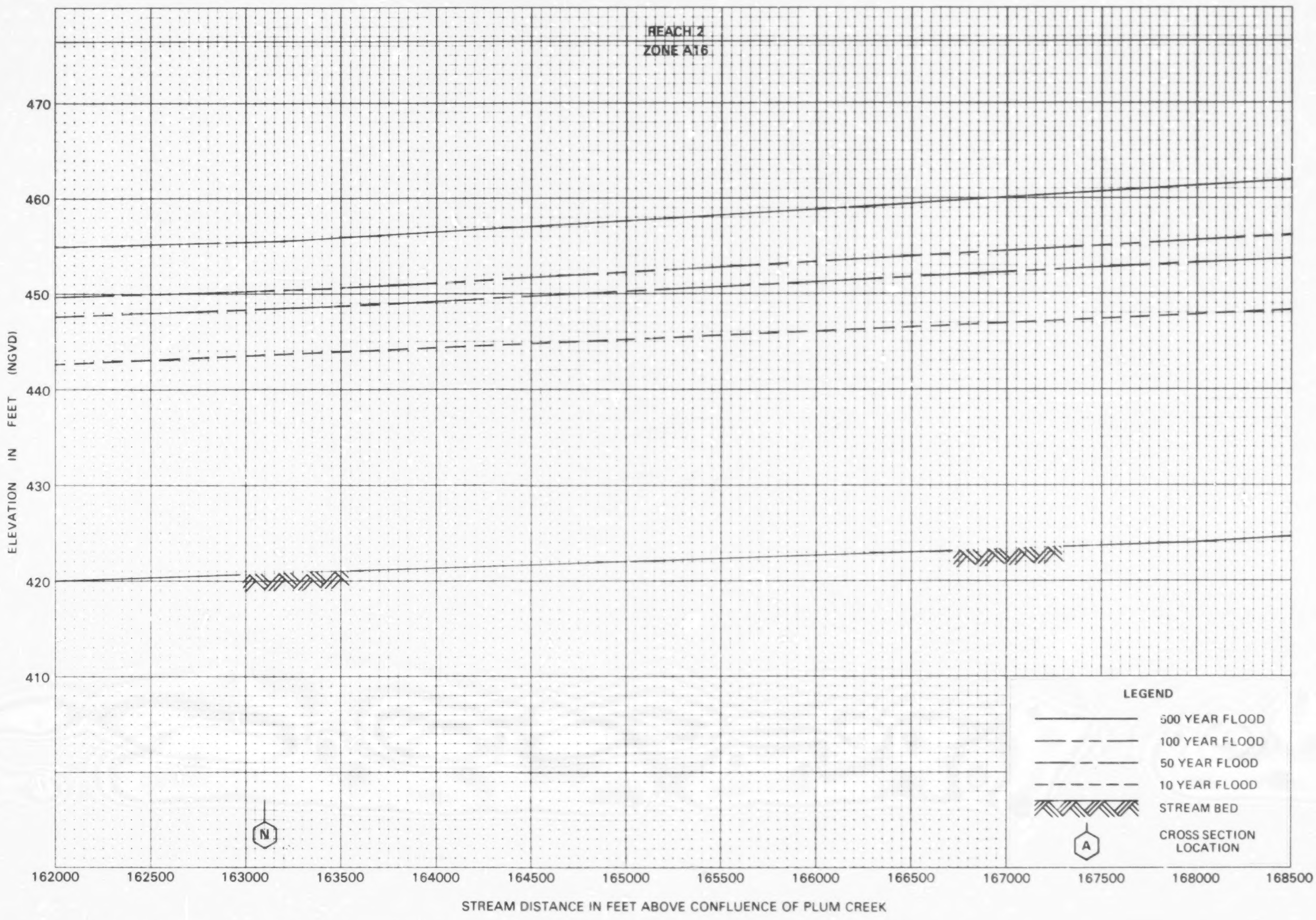
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

26P



FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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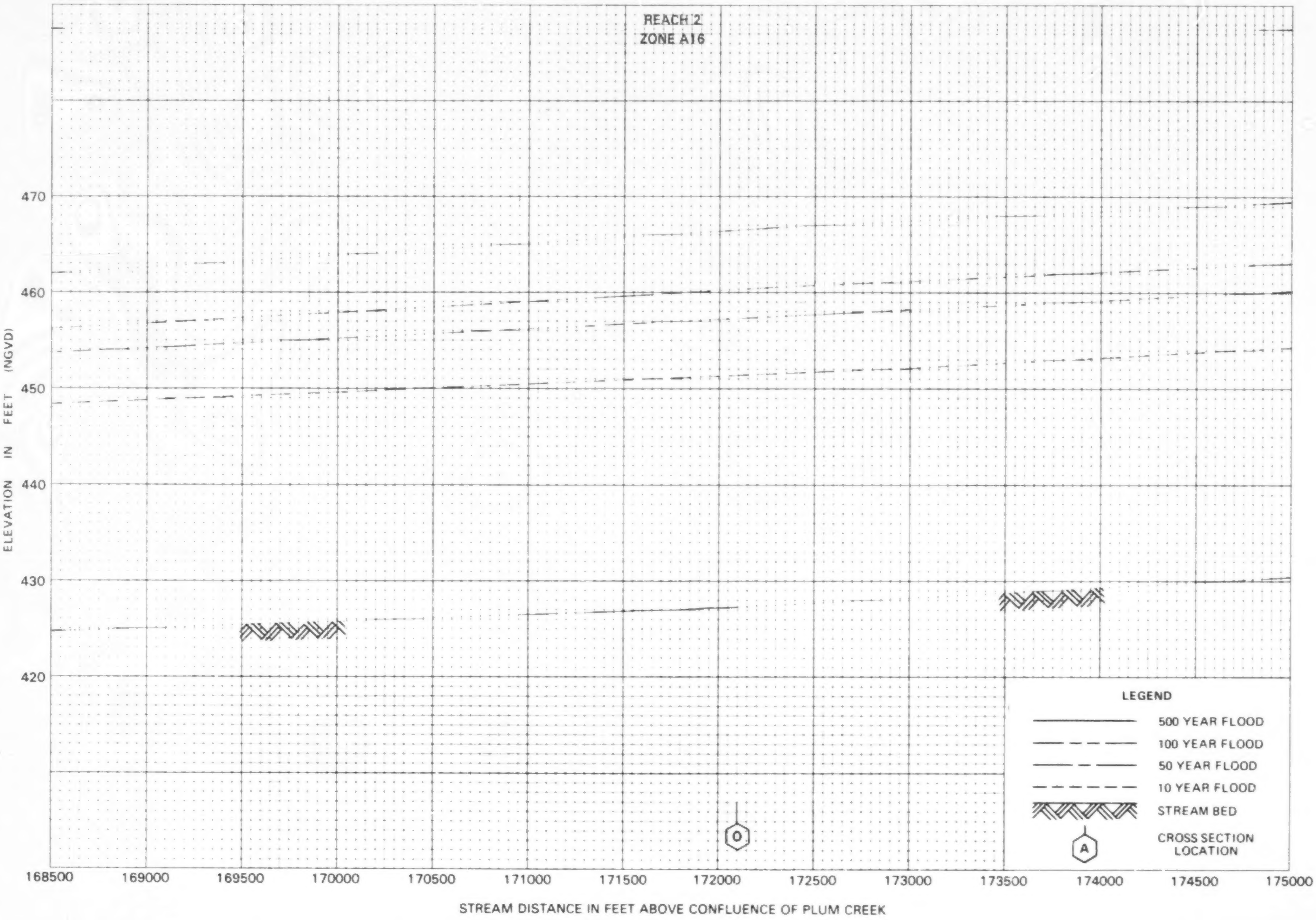
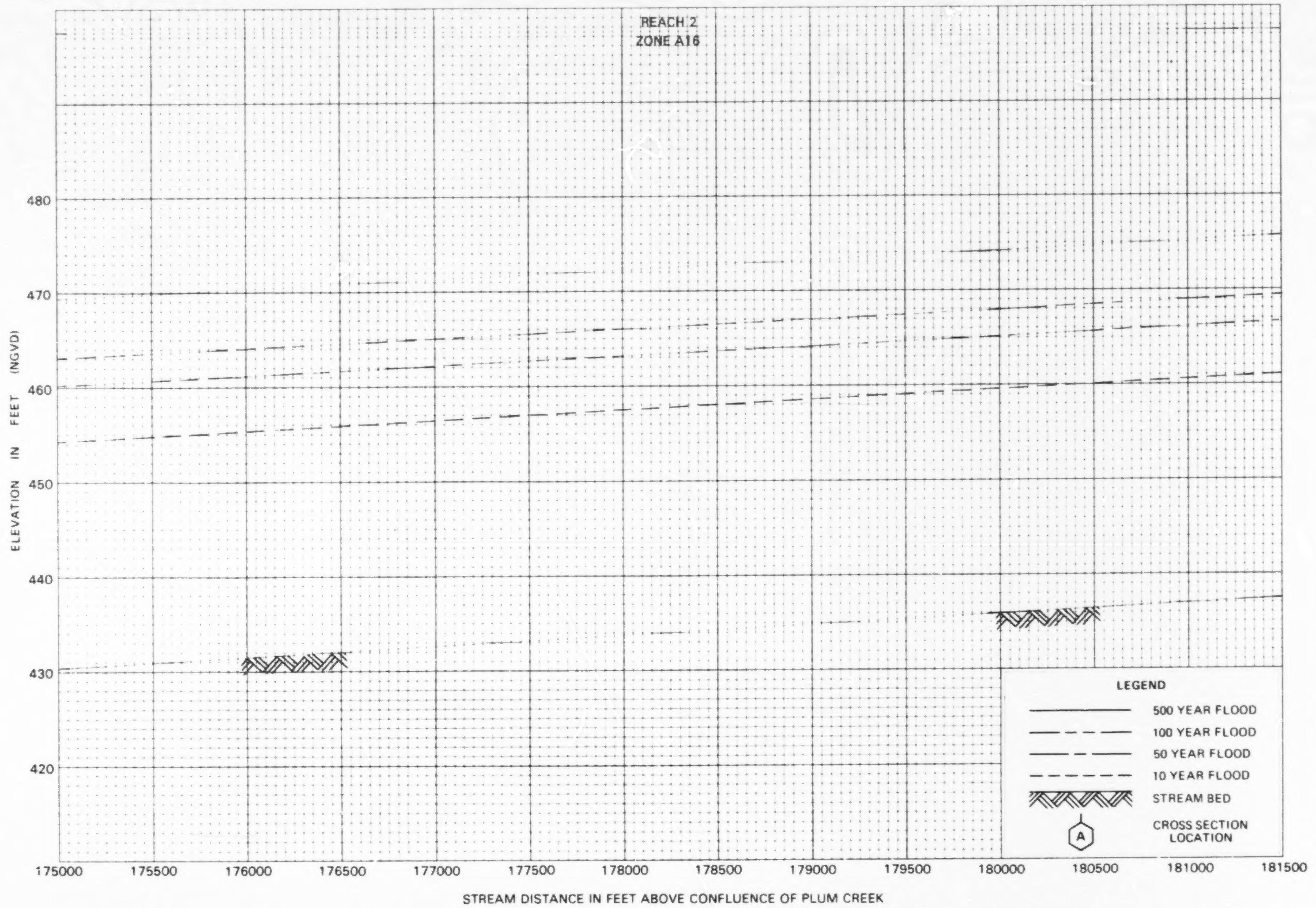


FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)



FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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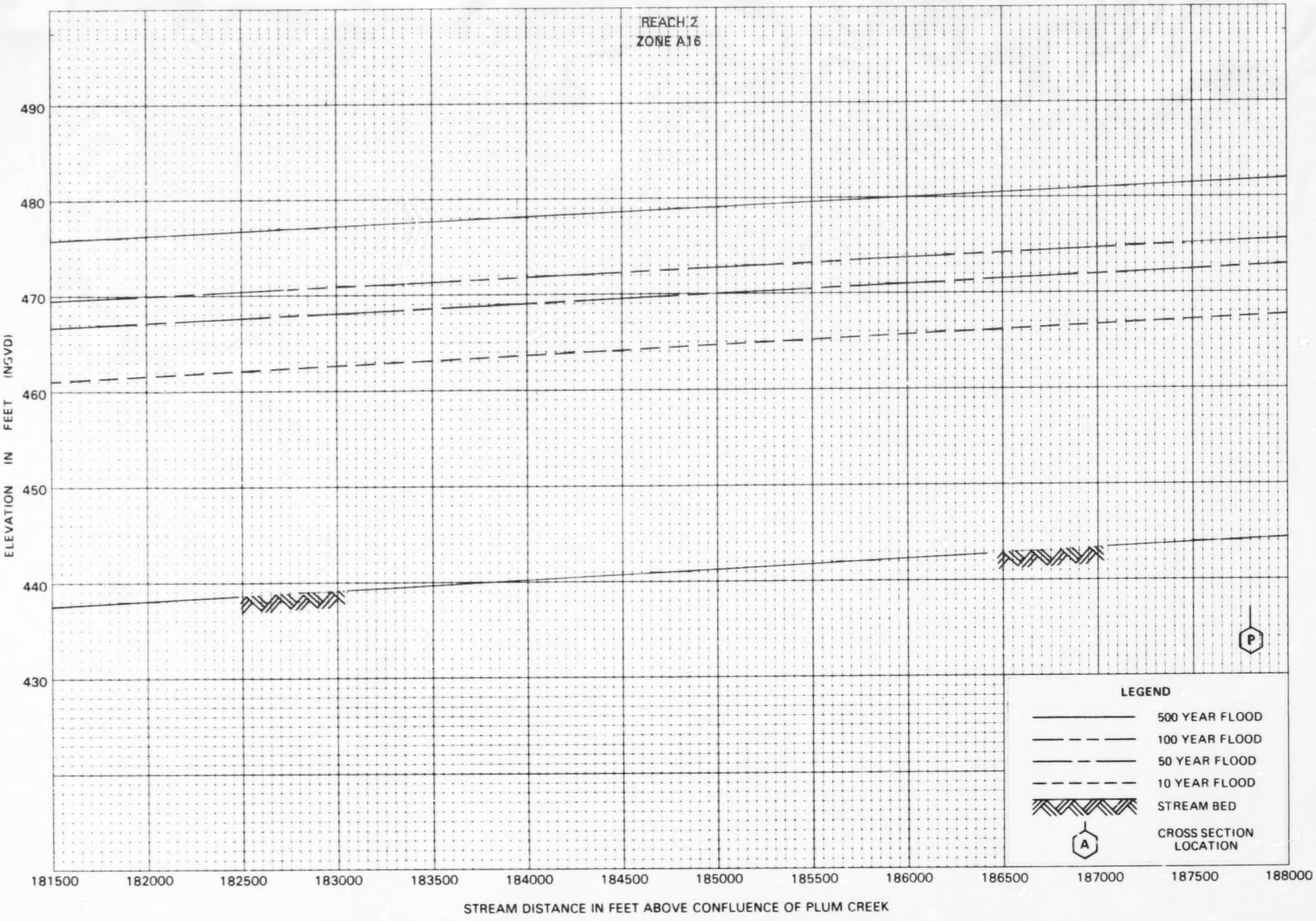

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

30P

58

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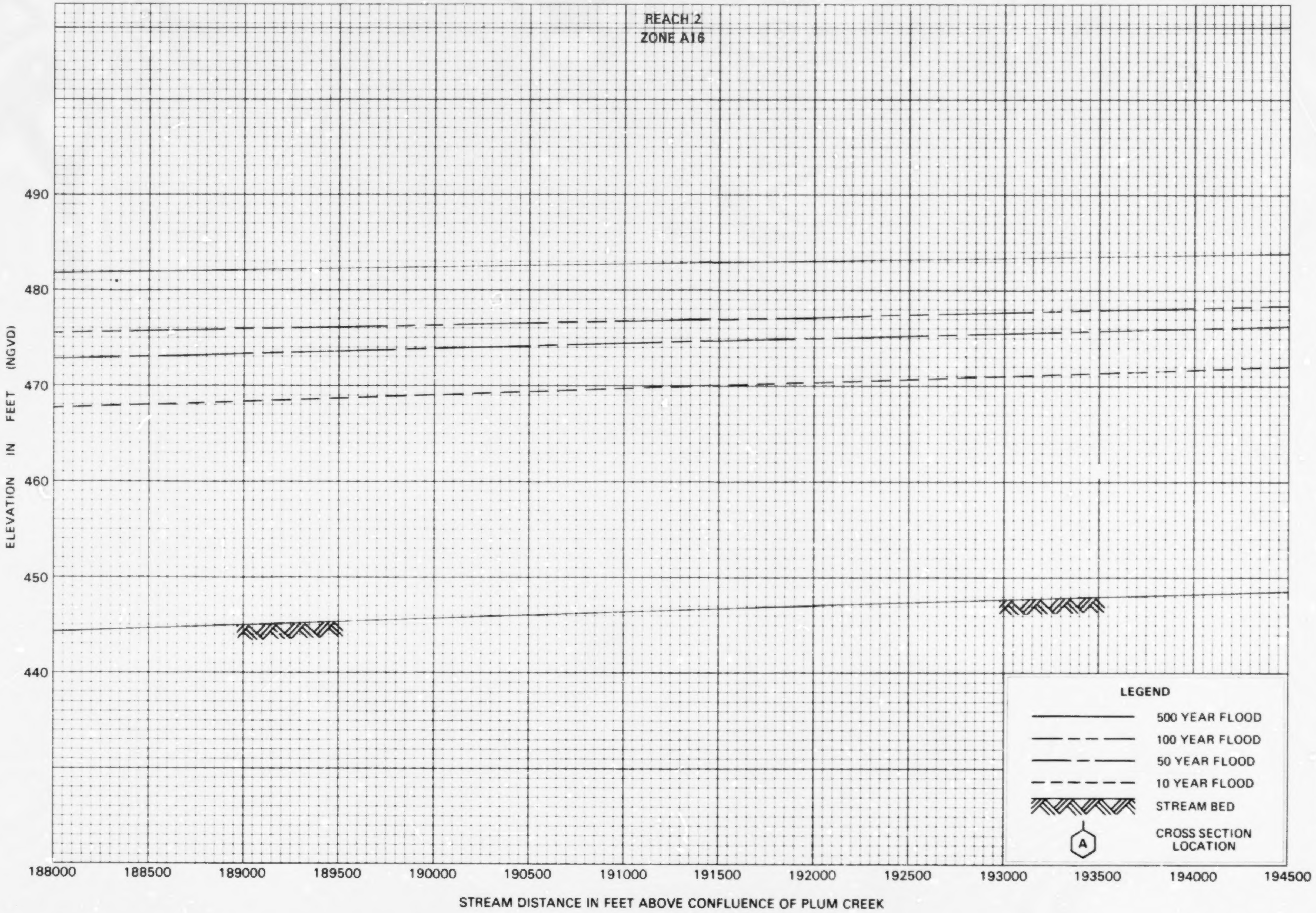

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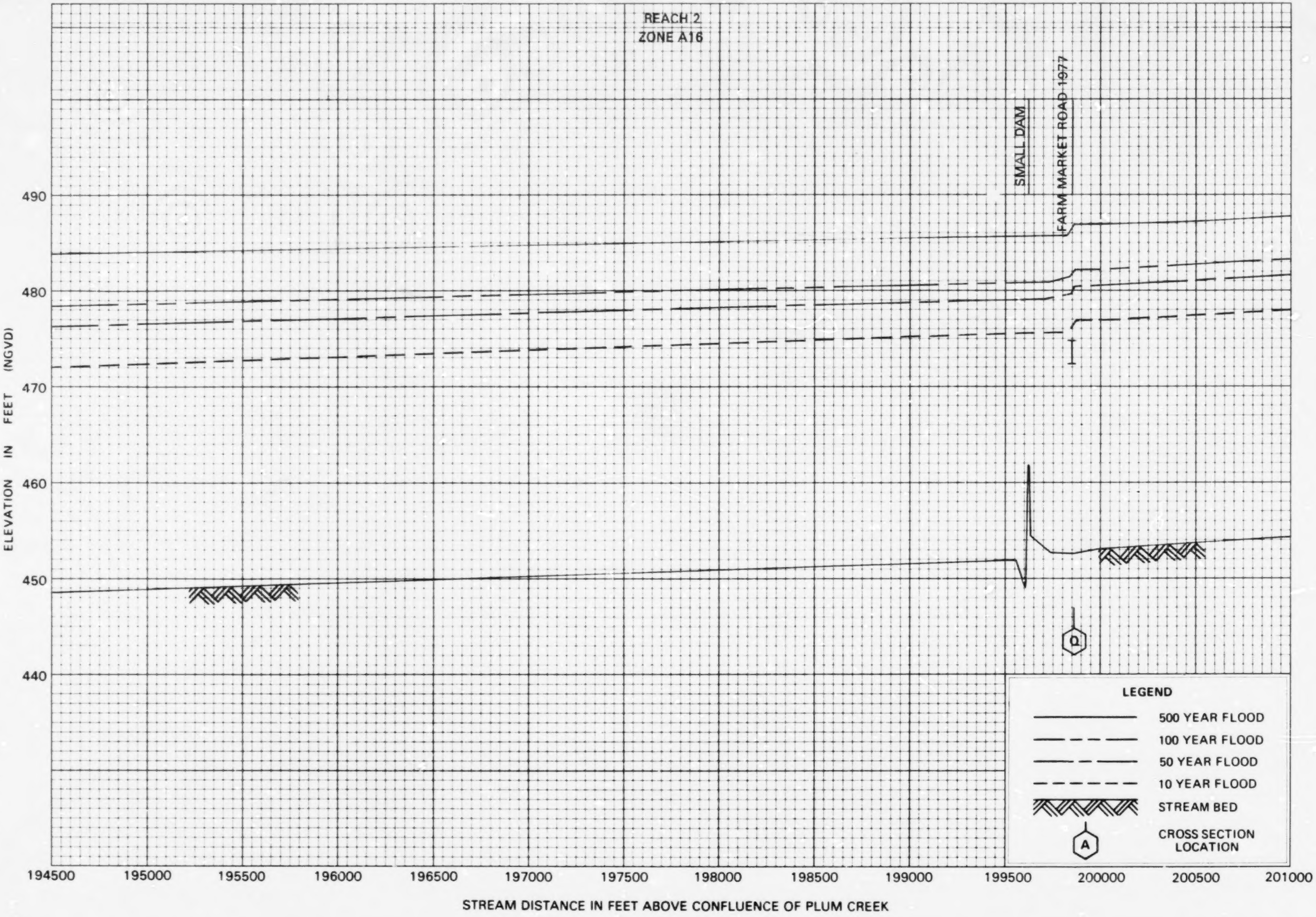
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

31P



FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

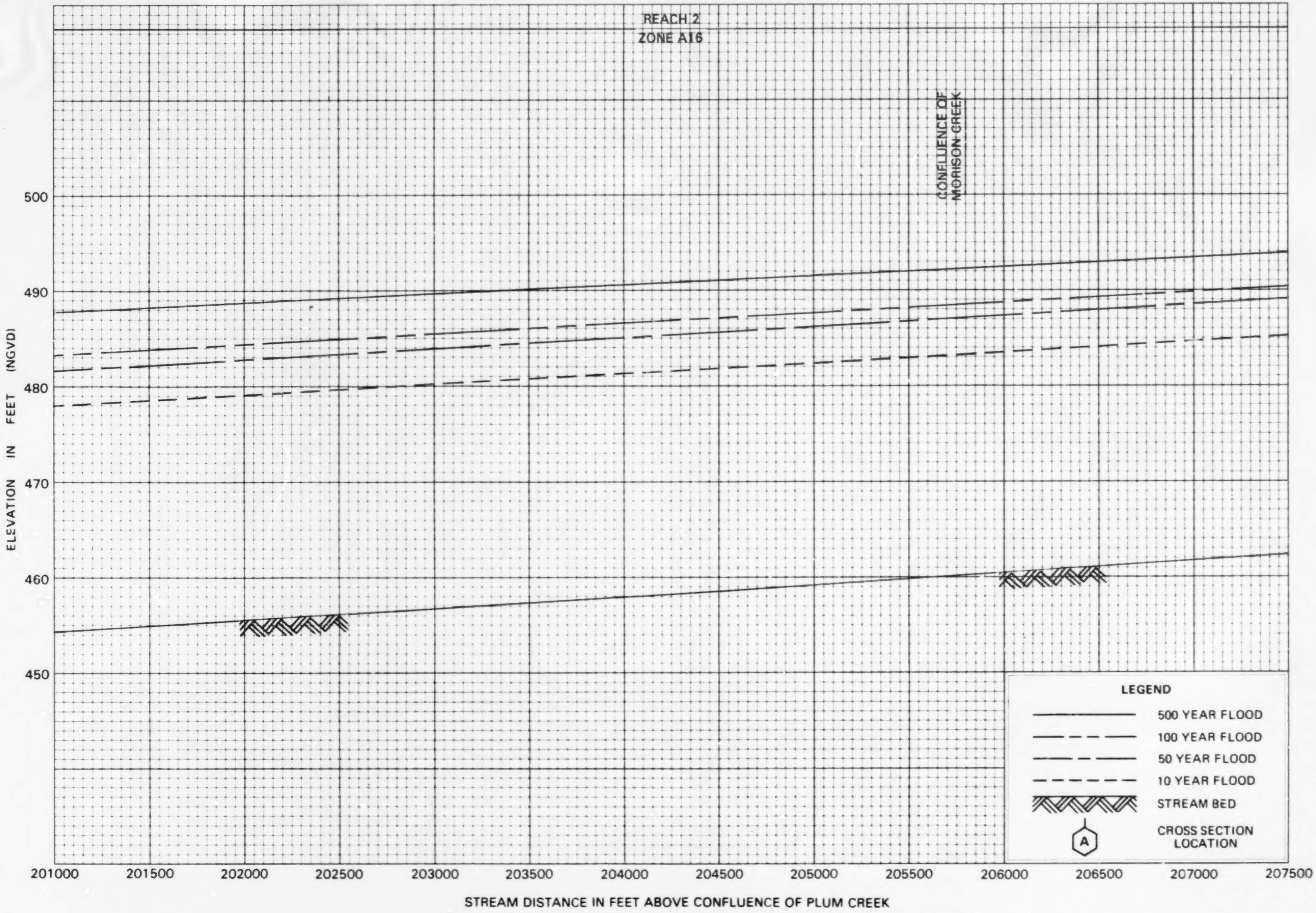
(UNINCORPORATED AREAS)

FLOOD PROFILES

SAN MARCOS RIVER

FLOOD PROFILES

SAN MARCOS RIVER

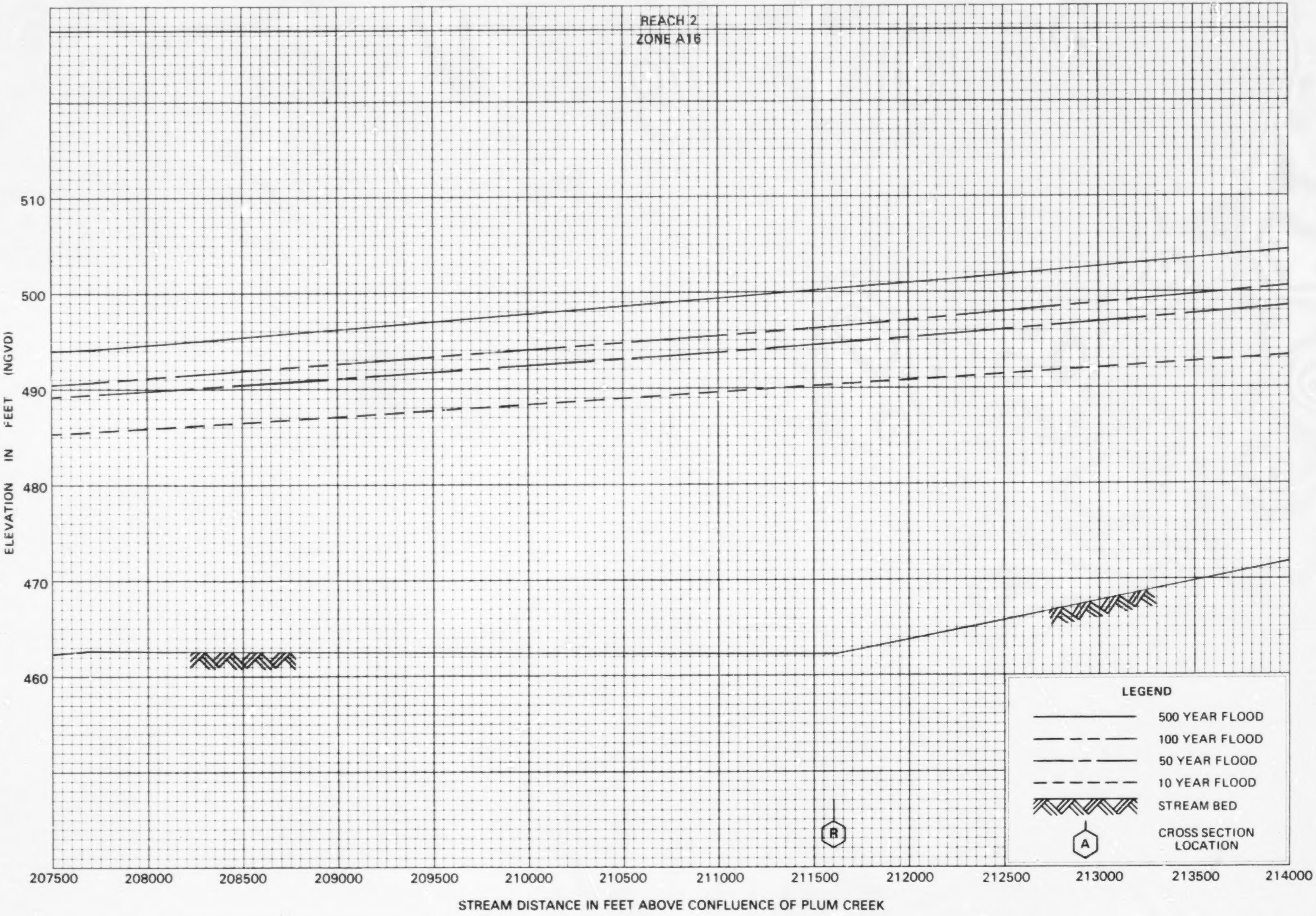


FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

33P

61



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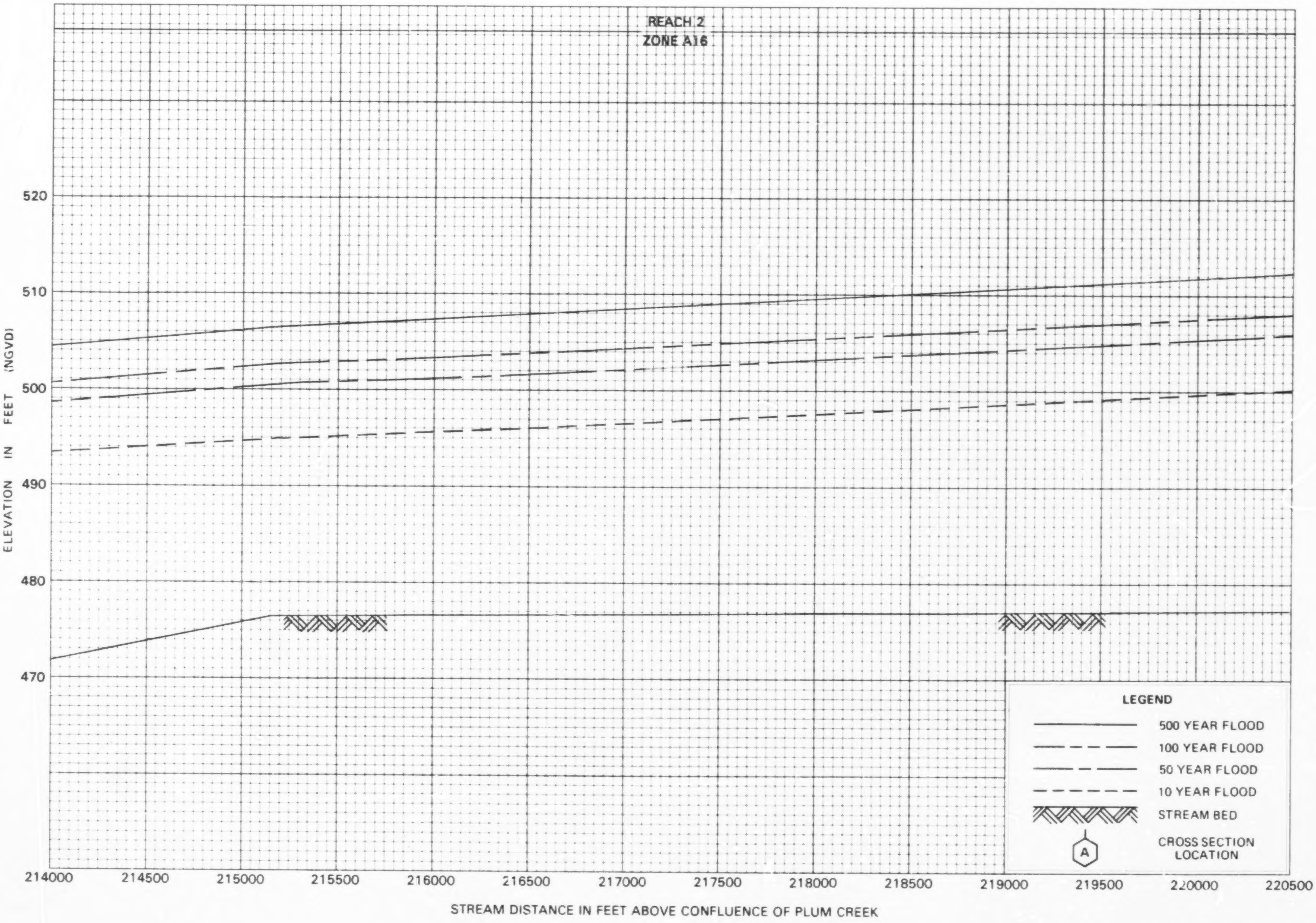
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

34P



FLOOD PROFILES

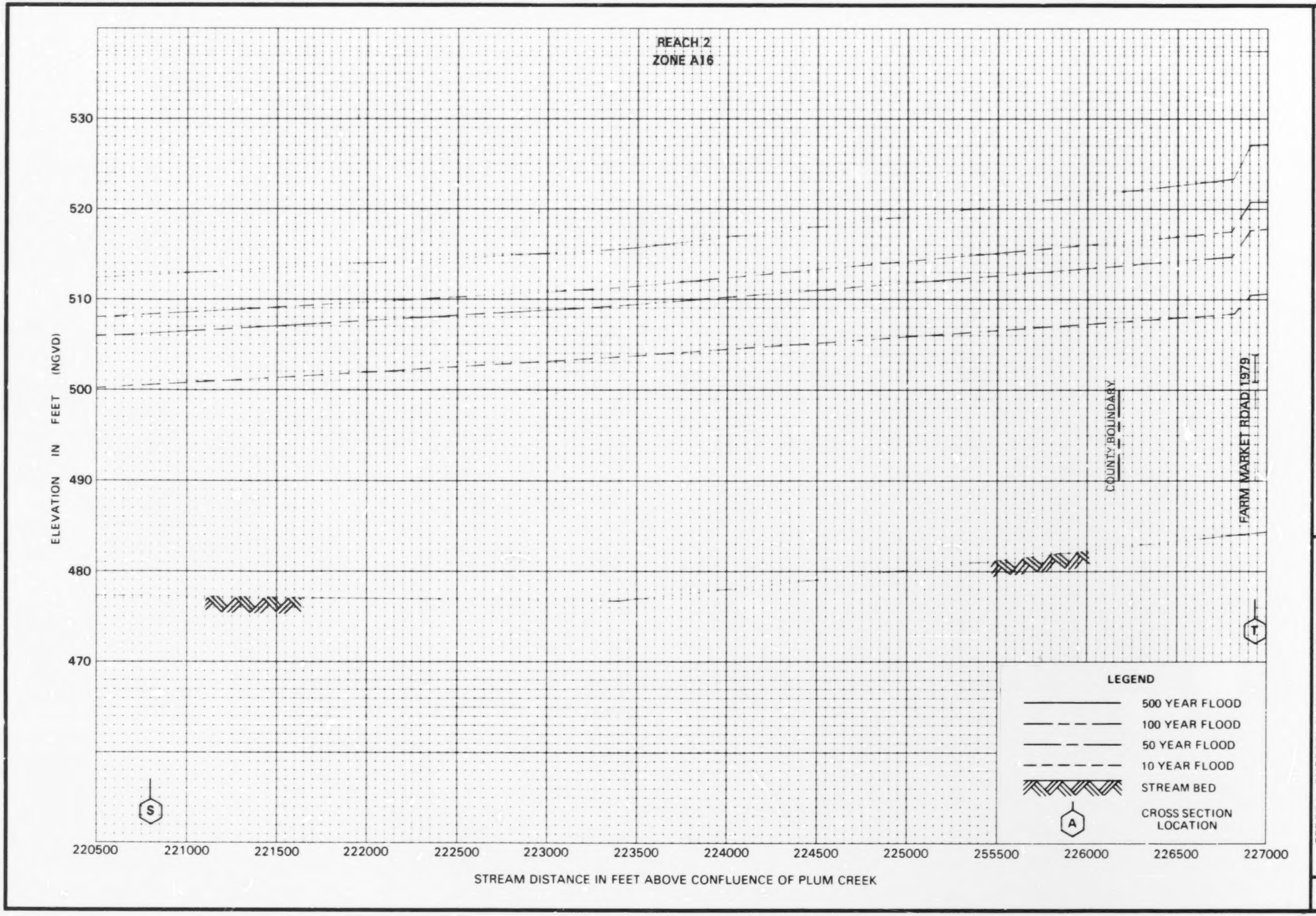
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

35P

63



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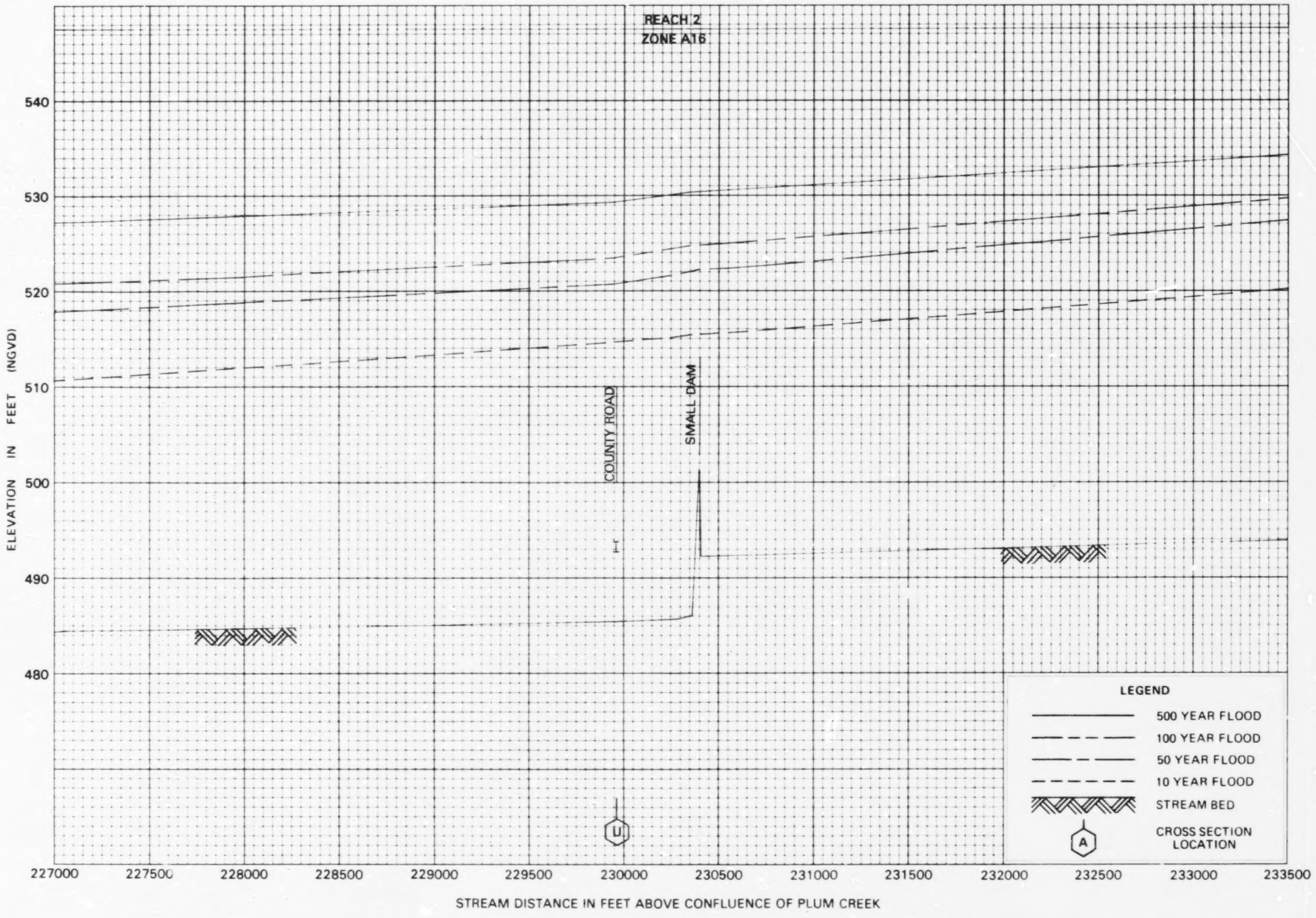
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)



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SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

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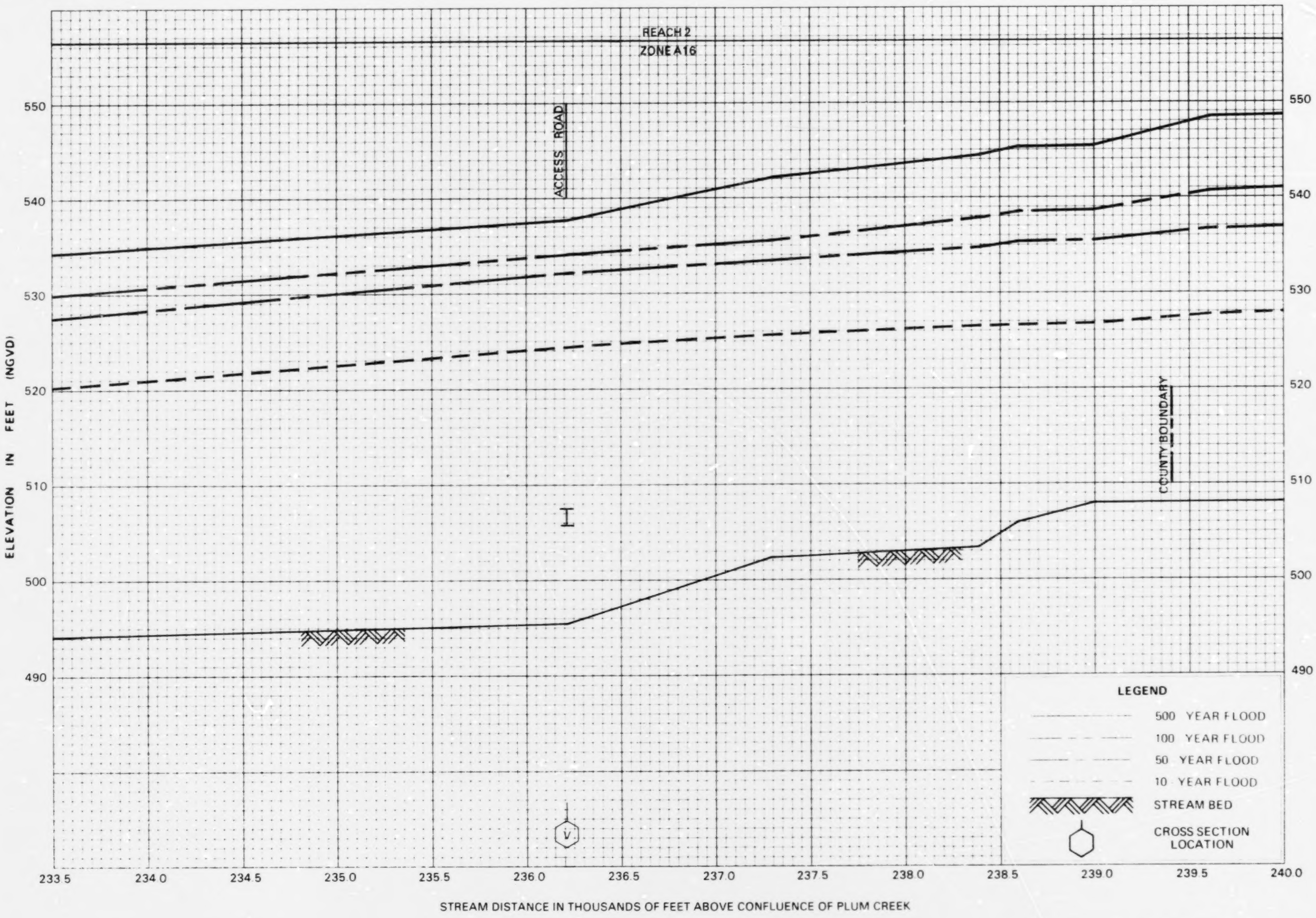

FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

38P

66

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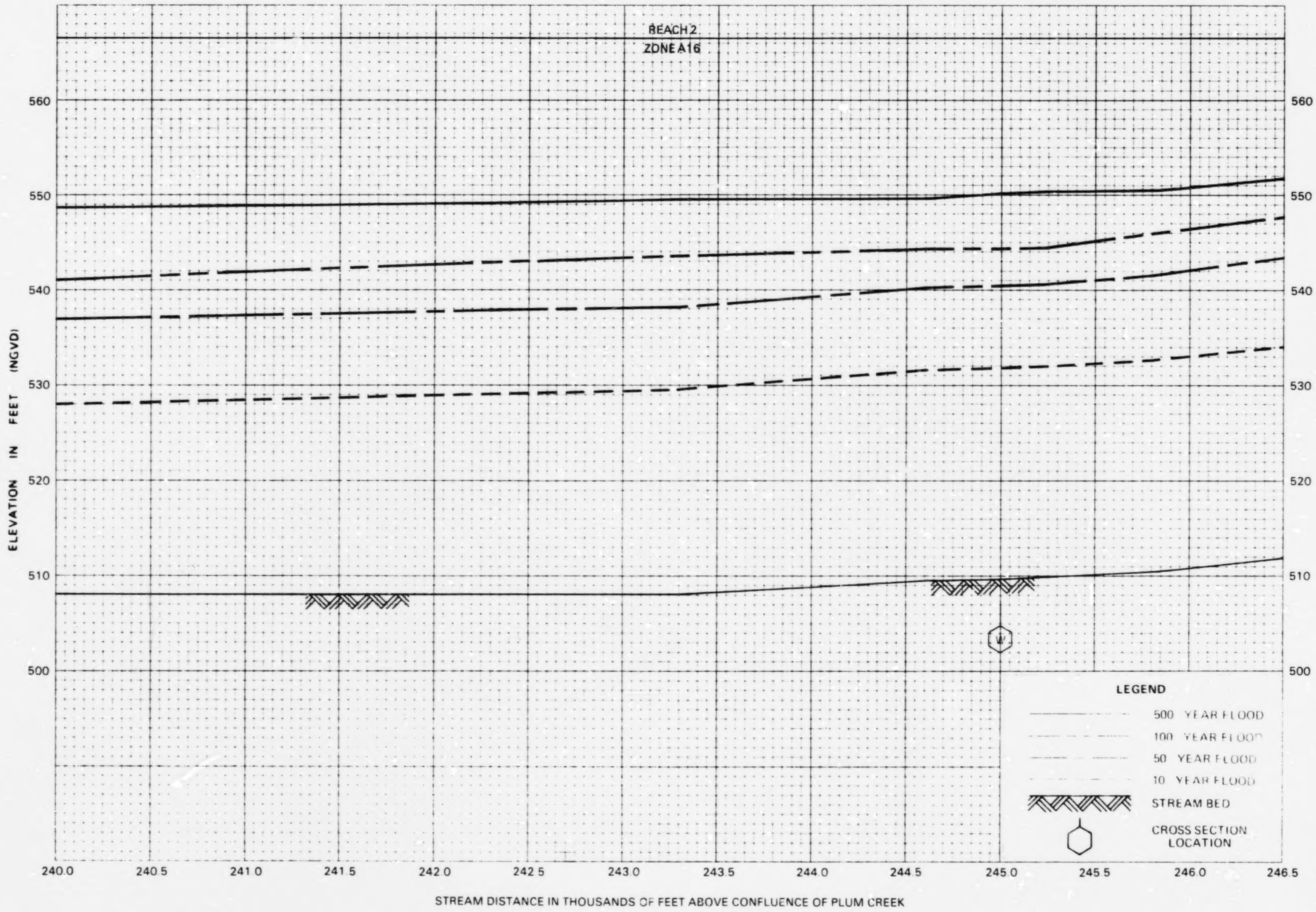

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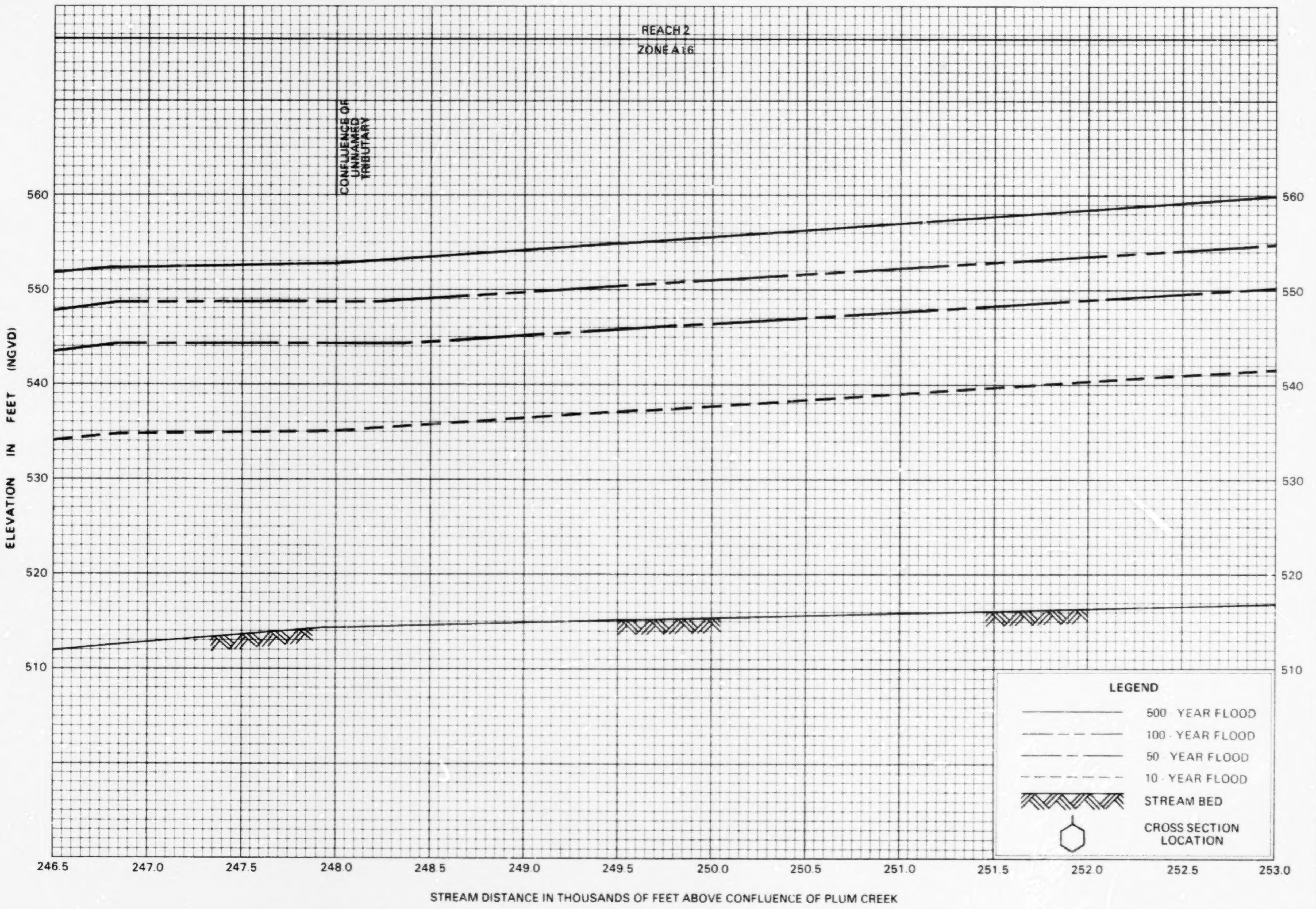
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

39P



FLOOD PROFILES

SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

40P

68

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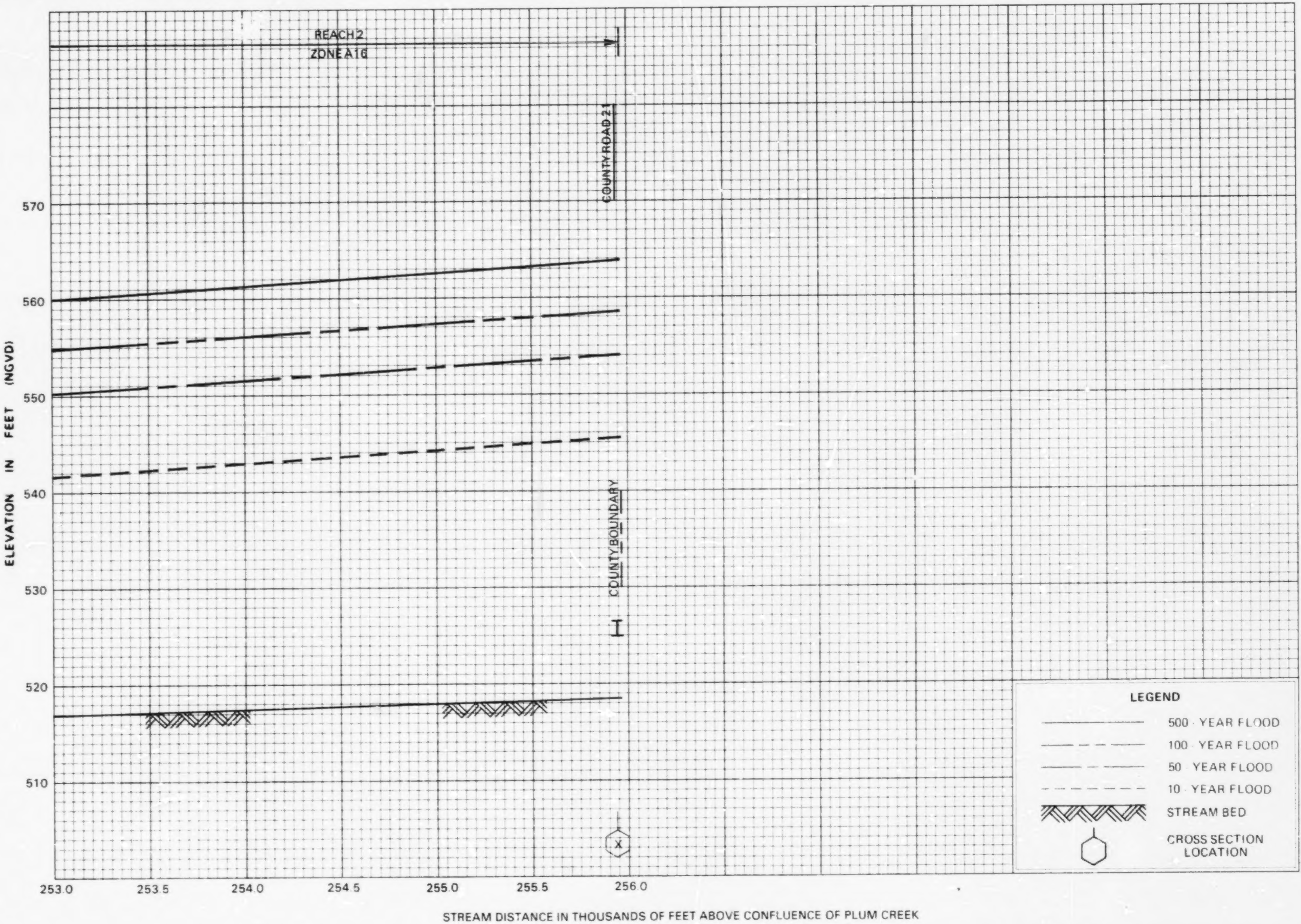

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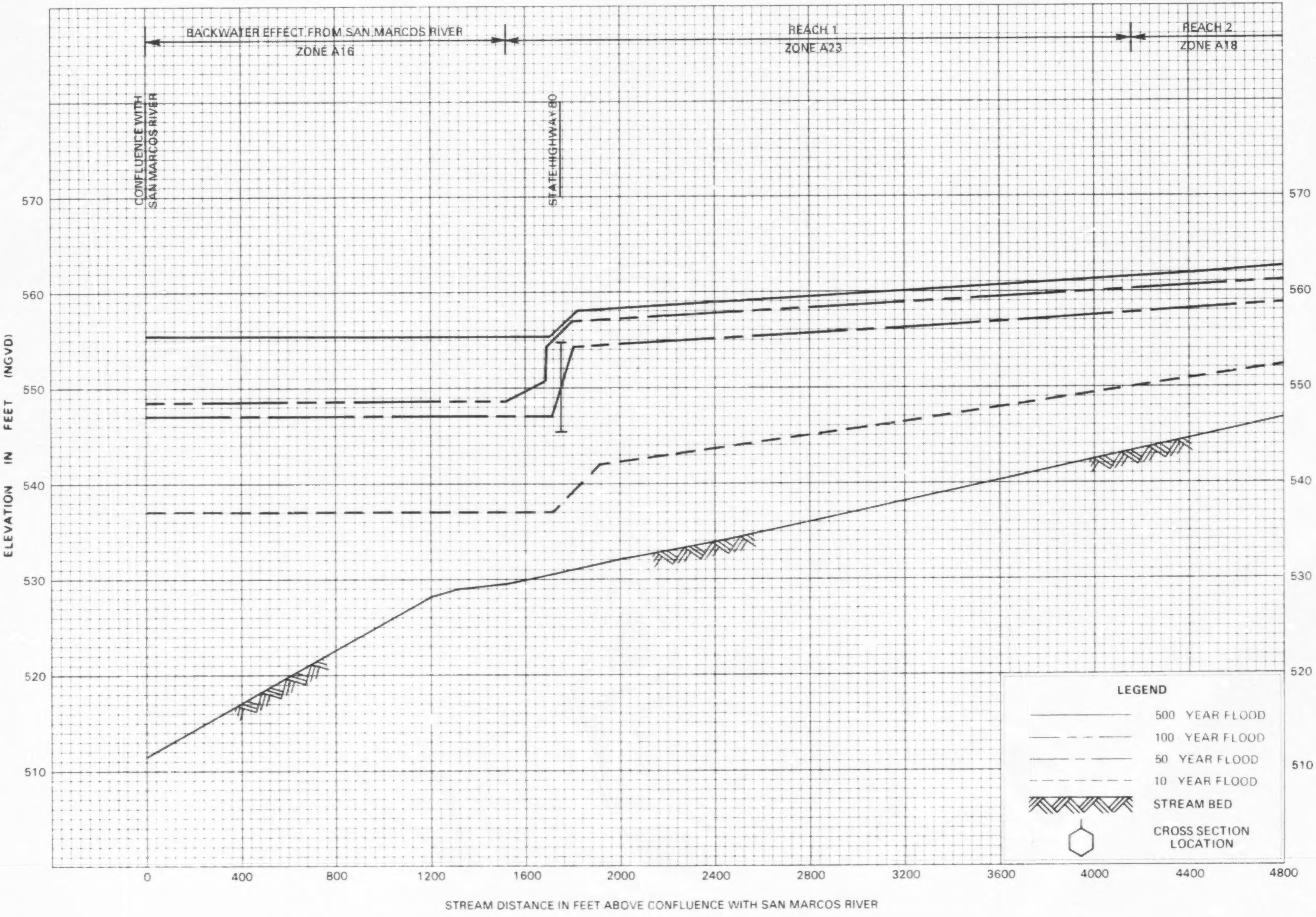
SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

41P

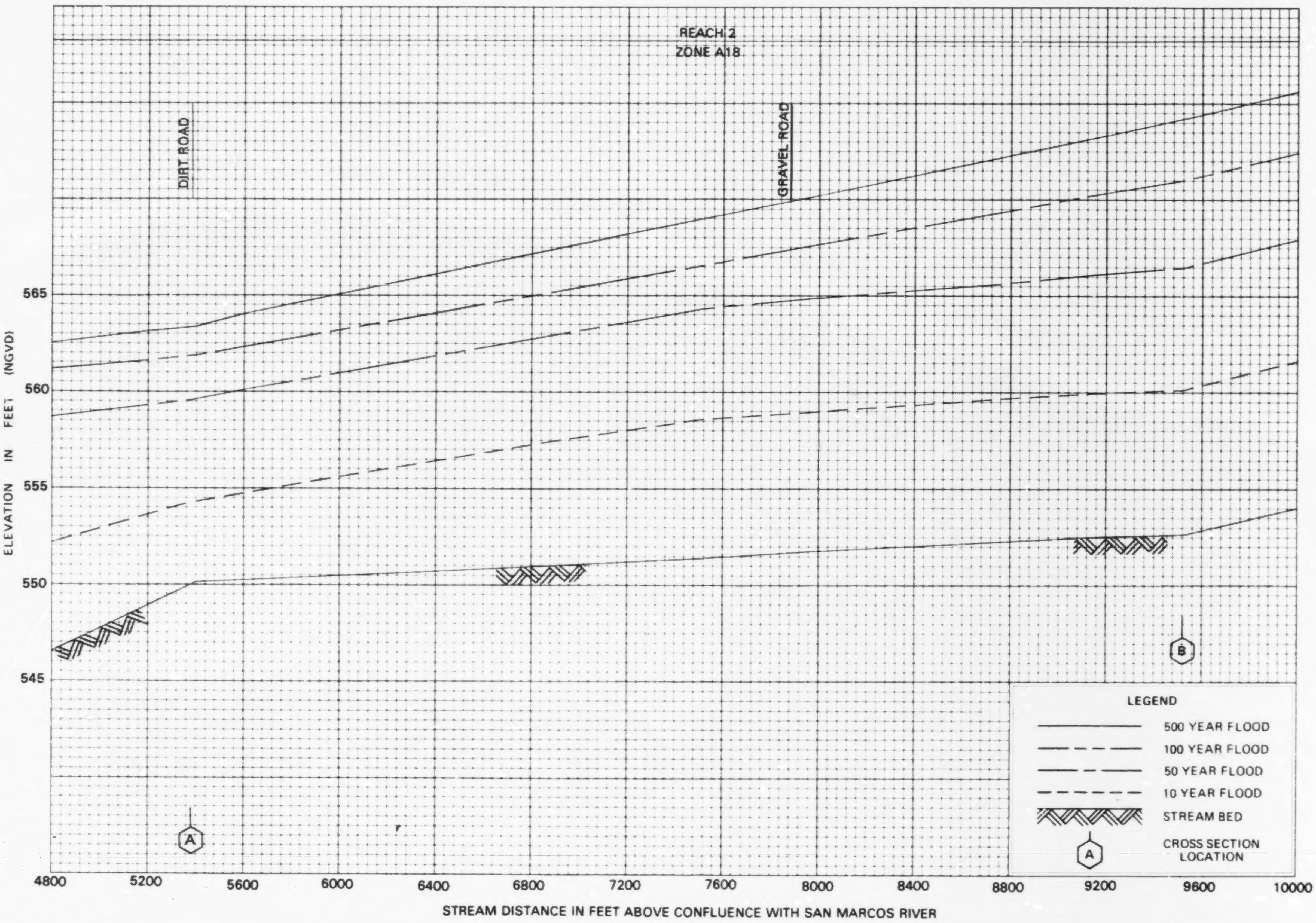


FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

FLOOD PROFILES

UNNAMED TRIBUTARY TO SAN MARCOS RIVER



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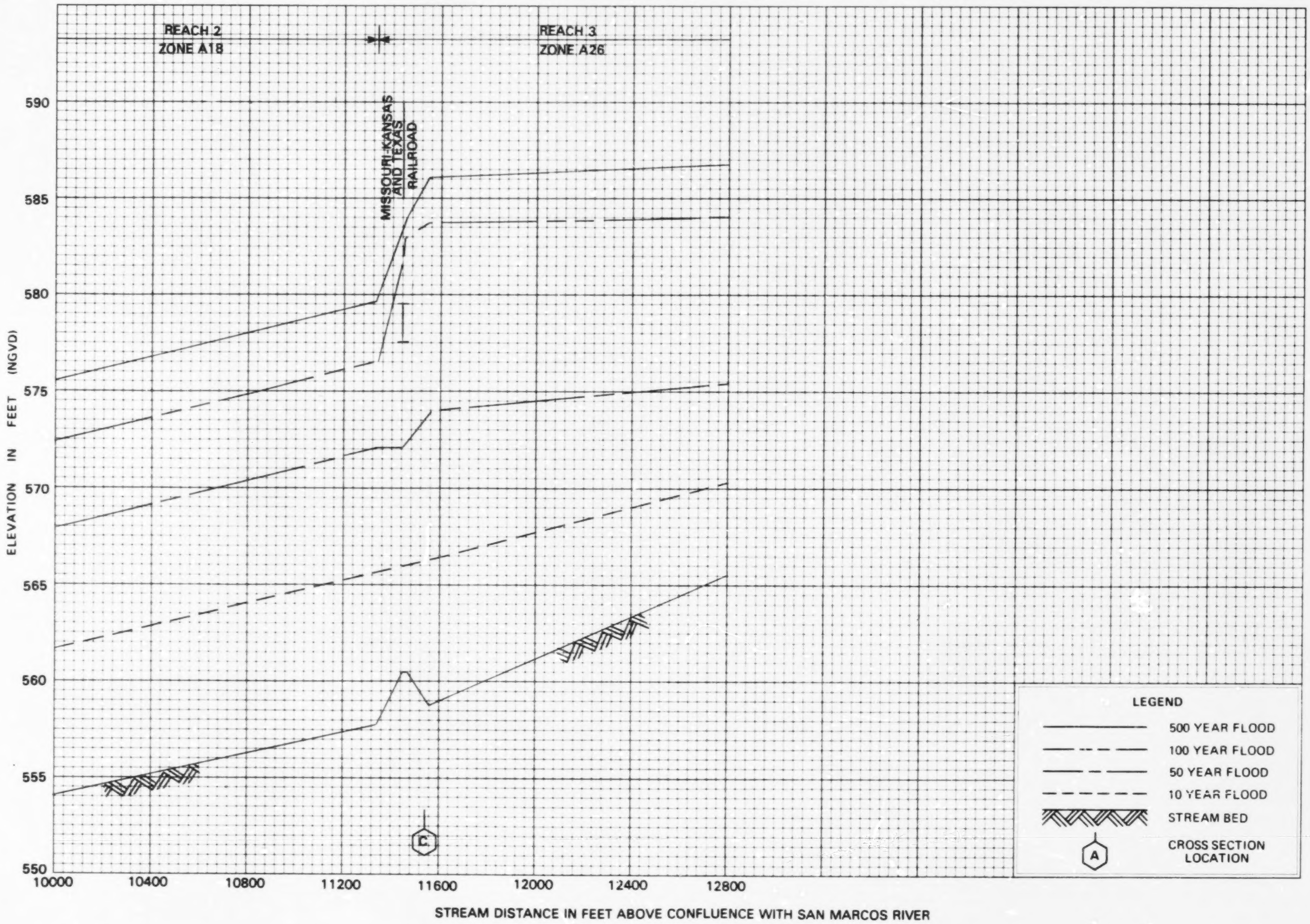
UNNAMED TRIBUTARY TO SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)



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UNNAMED TRIBUTARY TO SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

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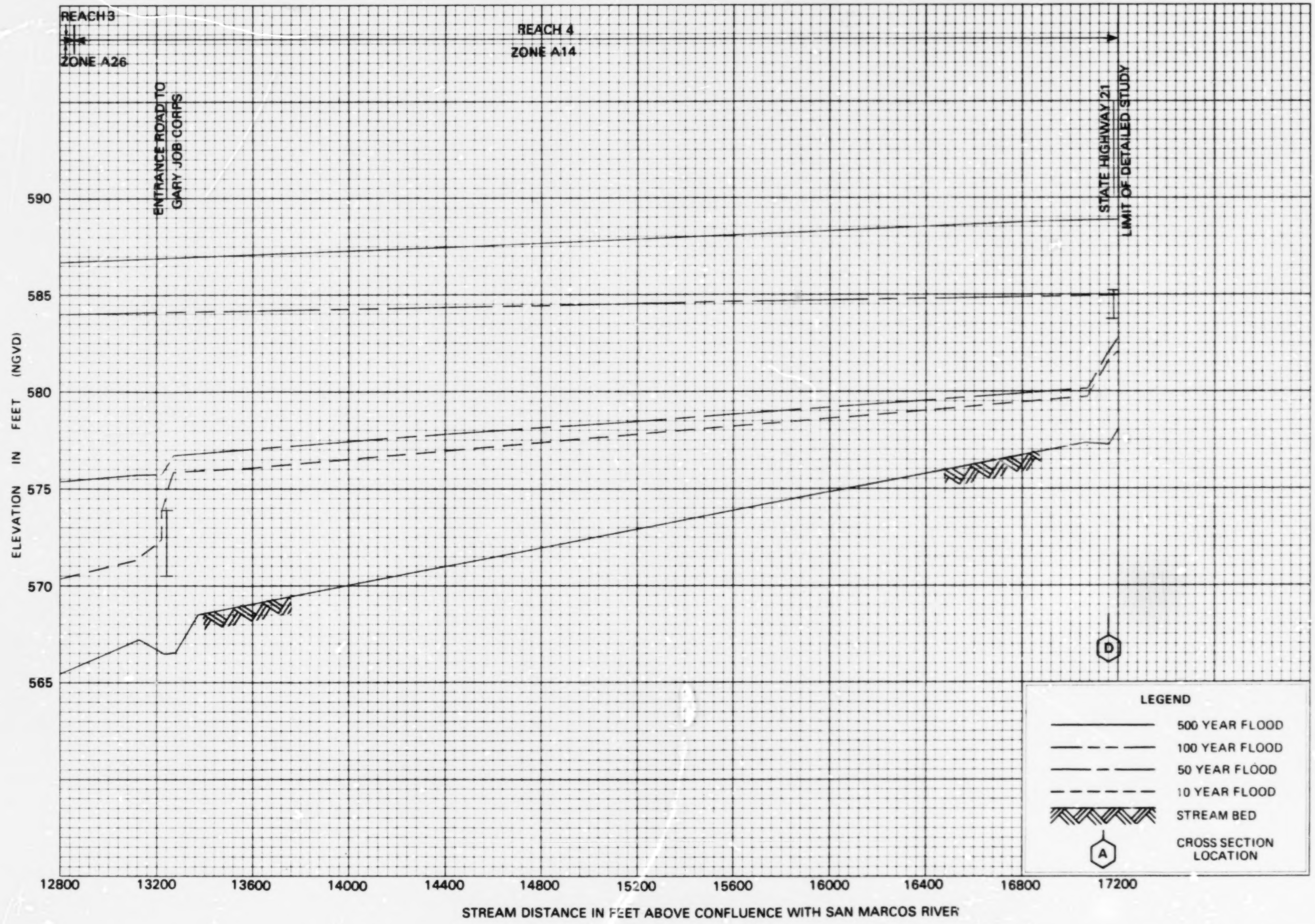


FLOOD PROFILES

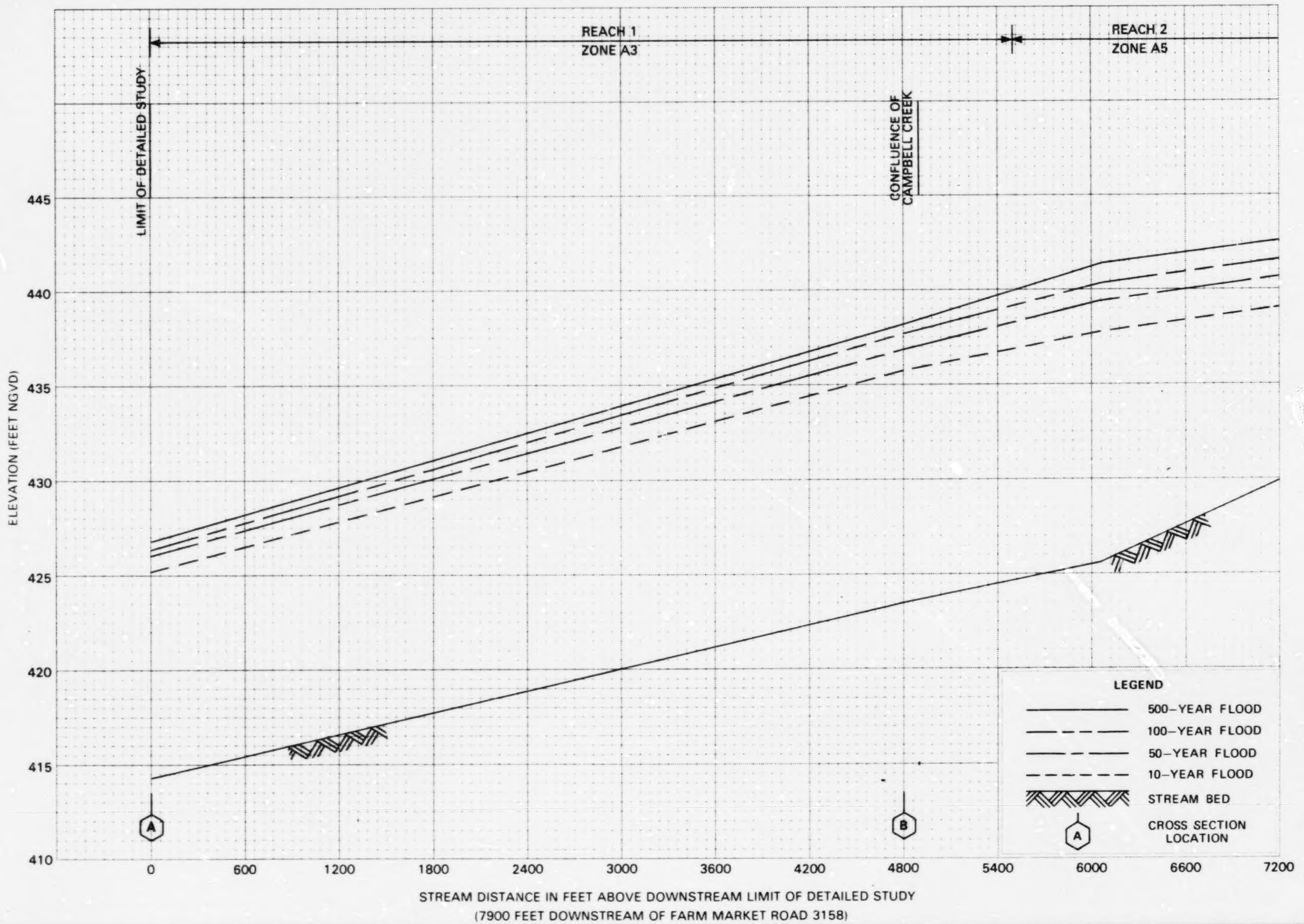
UNNAMED TRIBUTARY TO SAN MARCOS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

45P



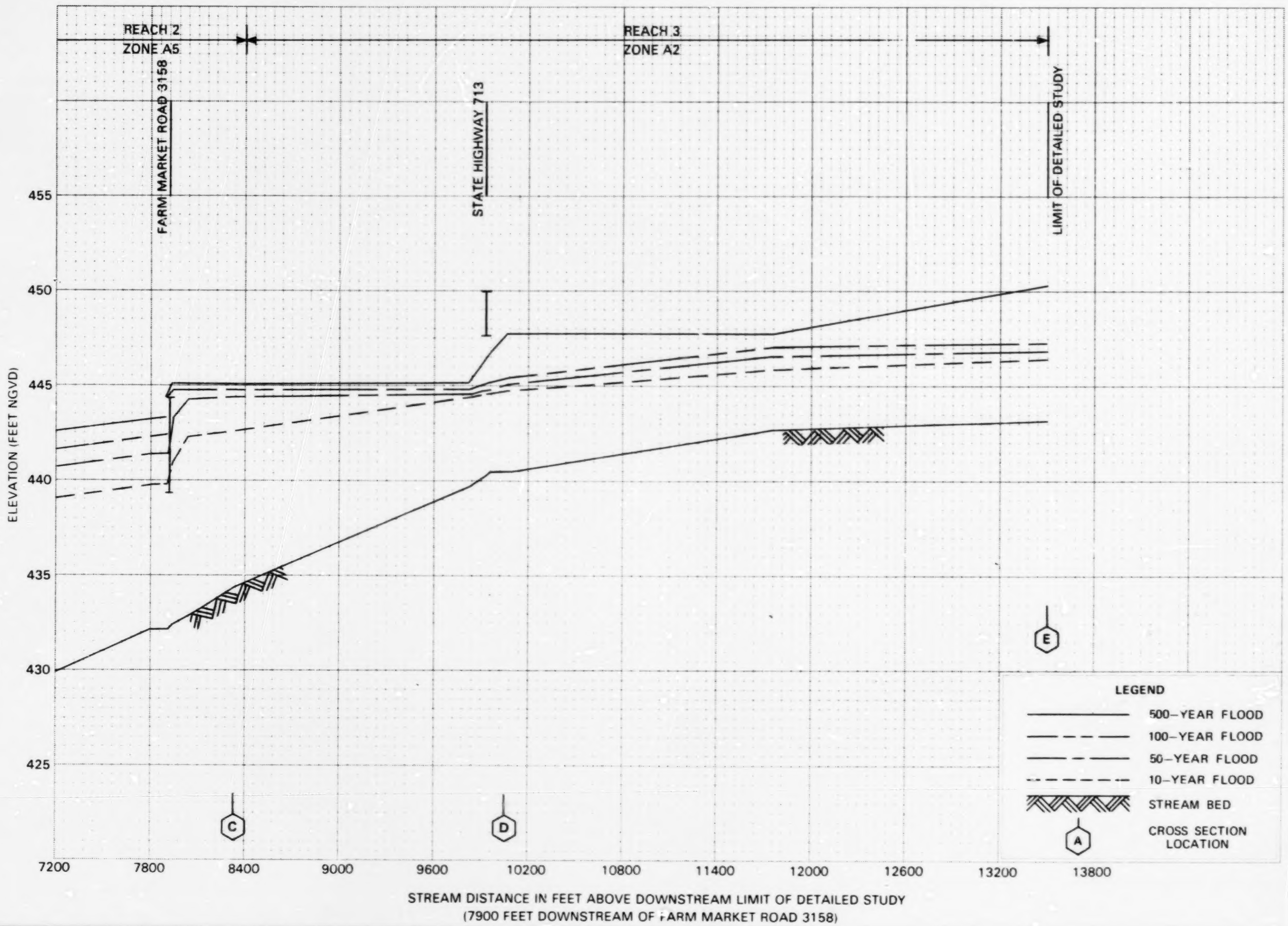
FLOOD PROFILES

TENNEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)



FLOOD PROFILES

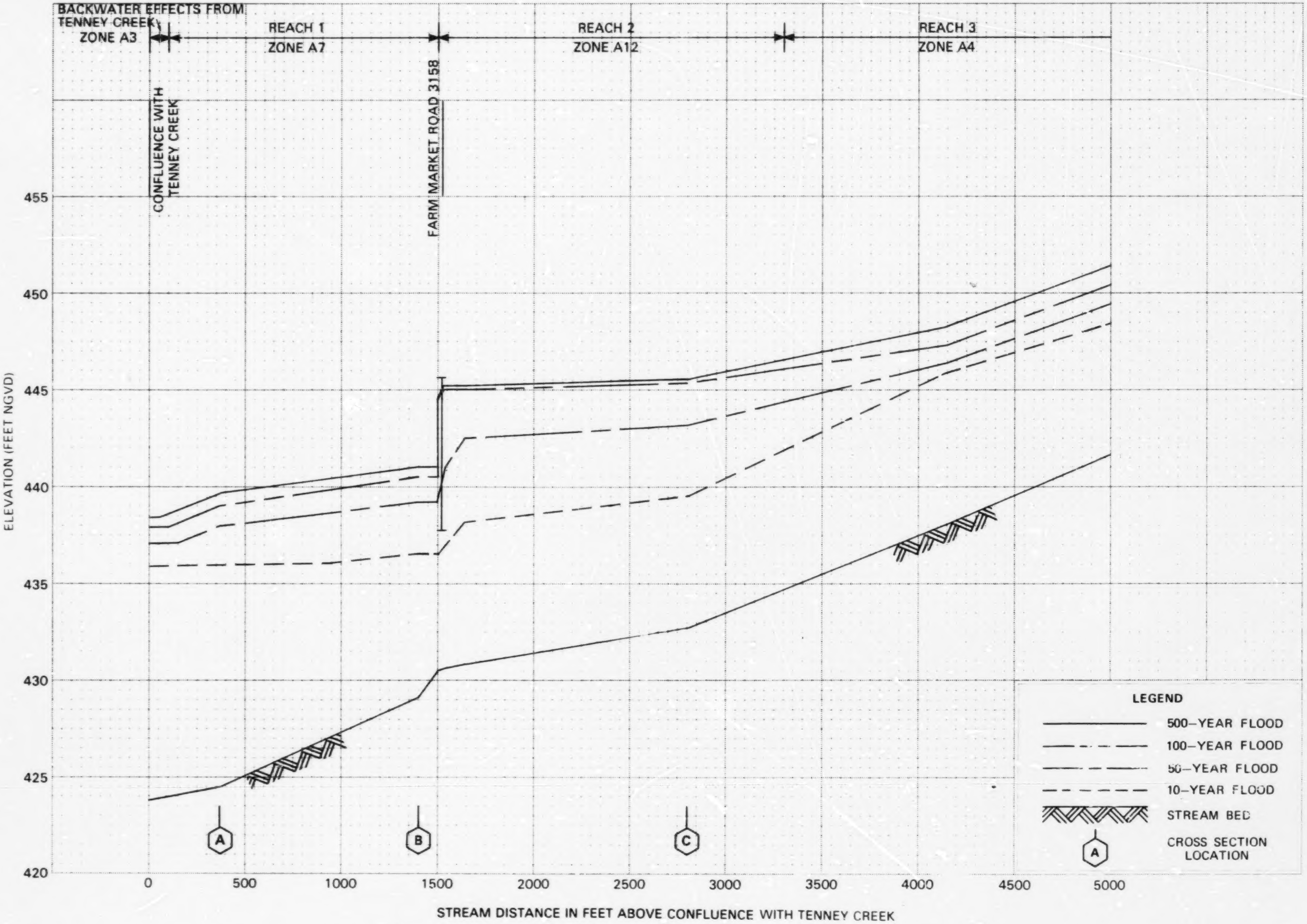
TENNEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

47P



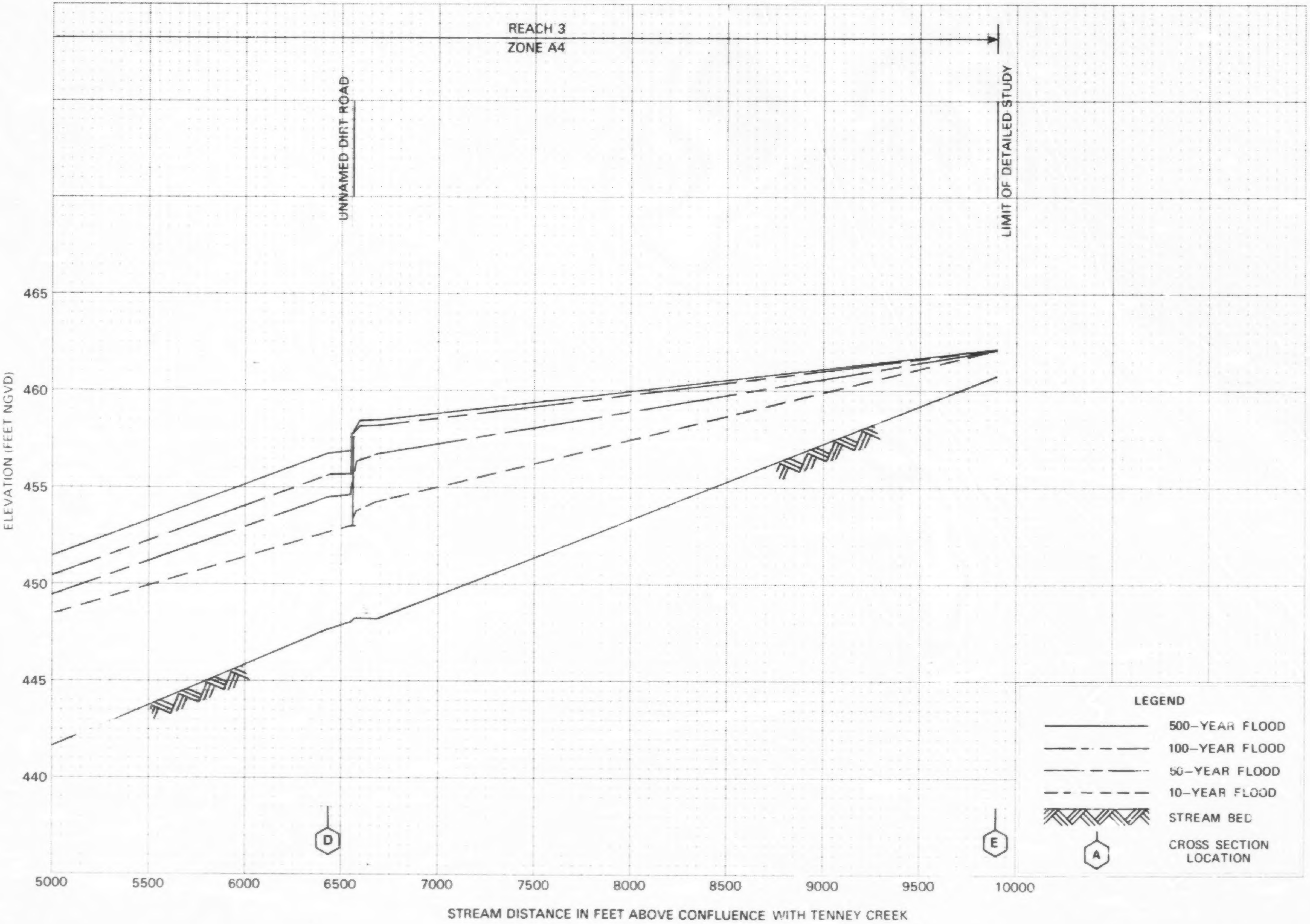
FLOOD PROFILES

CAMPBELL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

48P

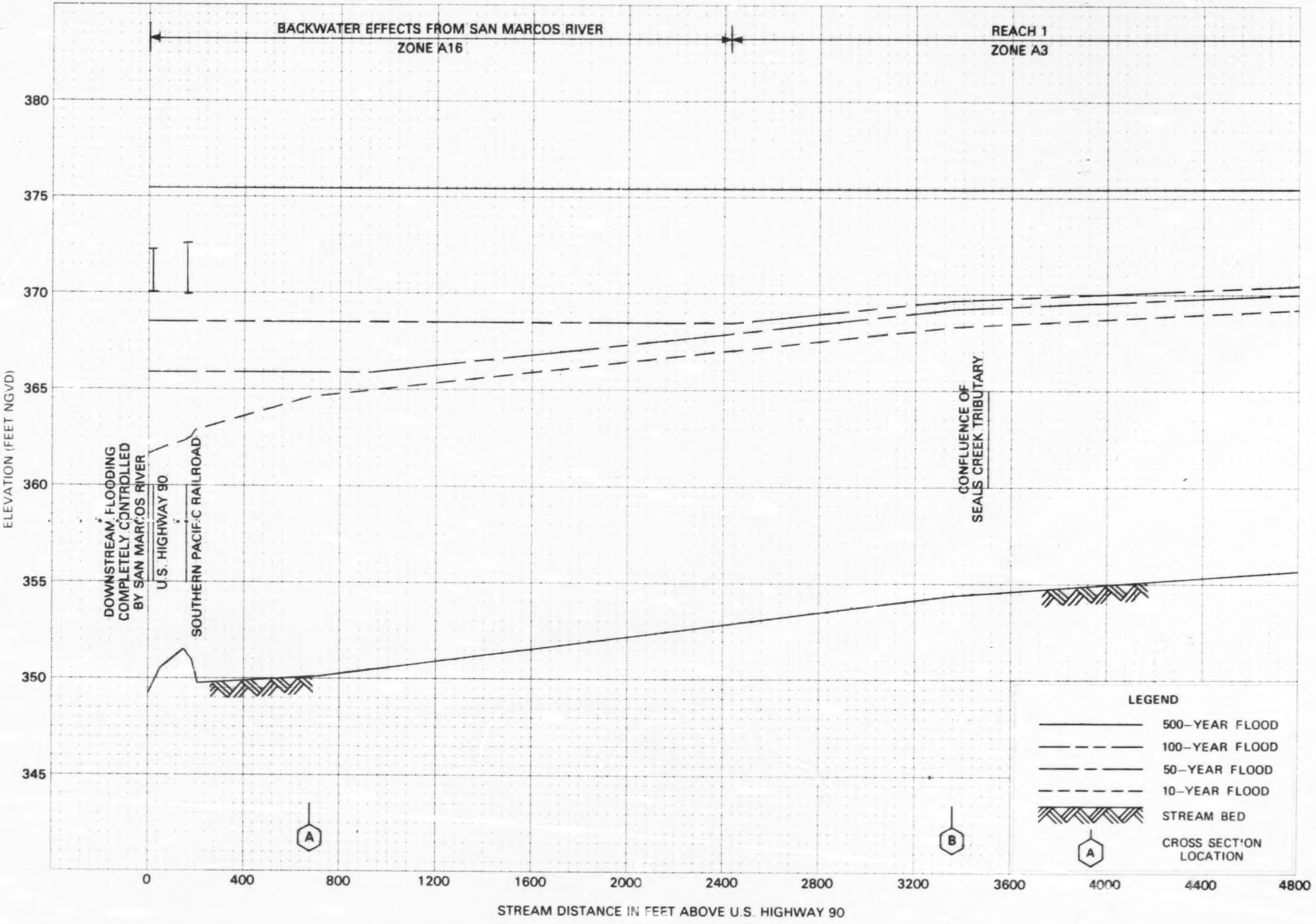


FLOOD PROFILES

CAMPBELL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)



FLOOD PROFILES

SEALS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

50P

78

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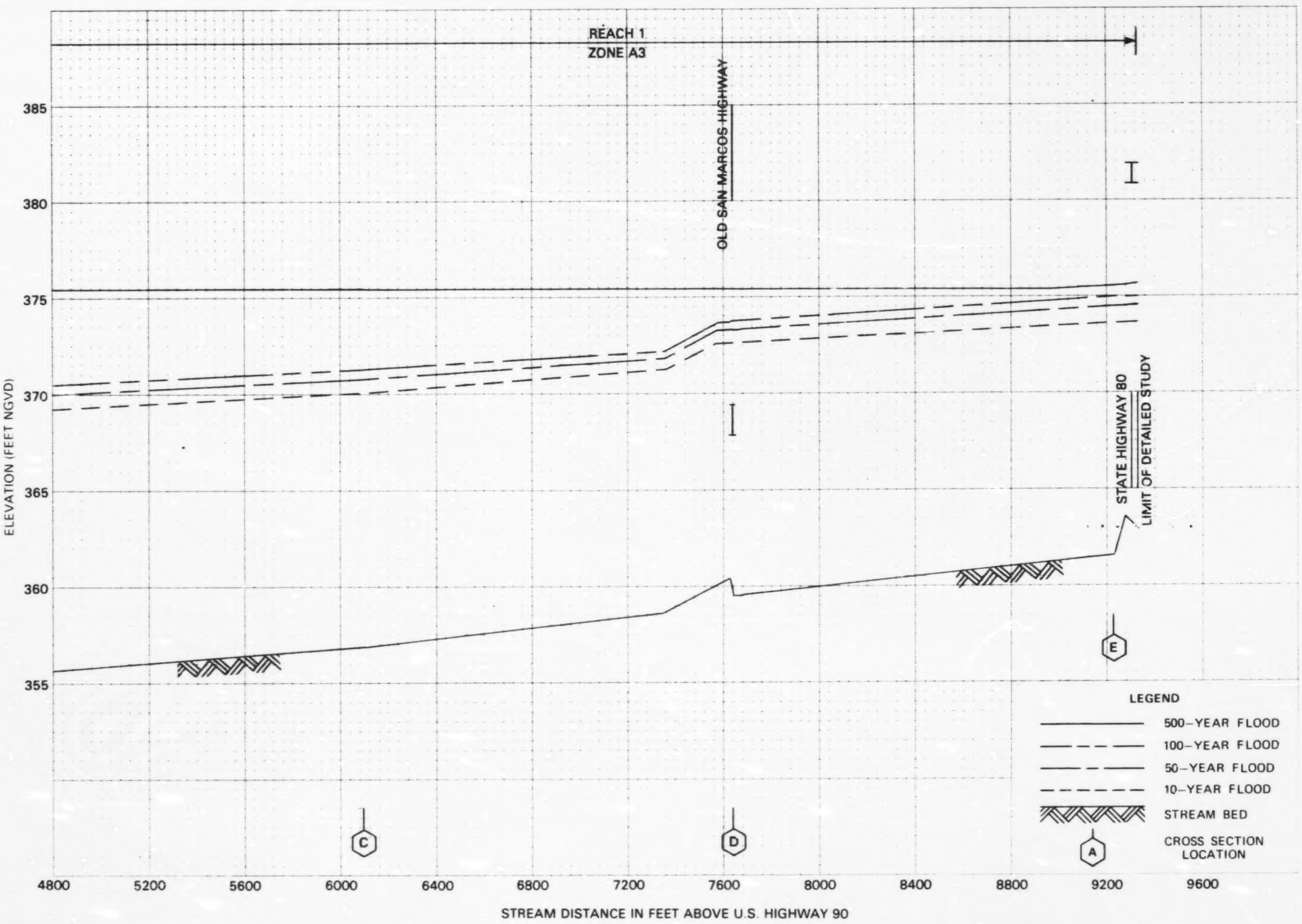

FLOOD PROFILES

SEALS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

51P

79

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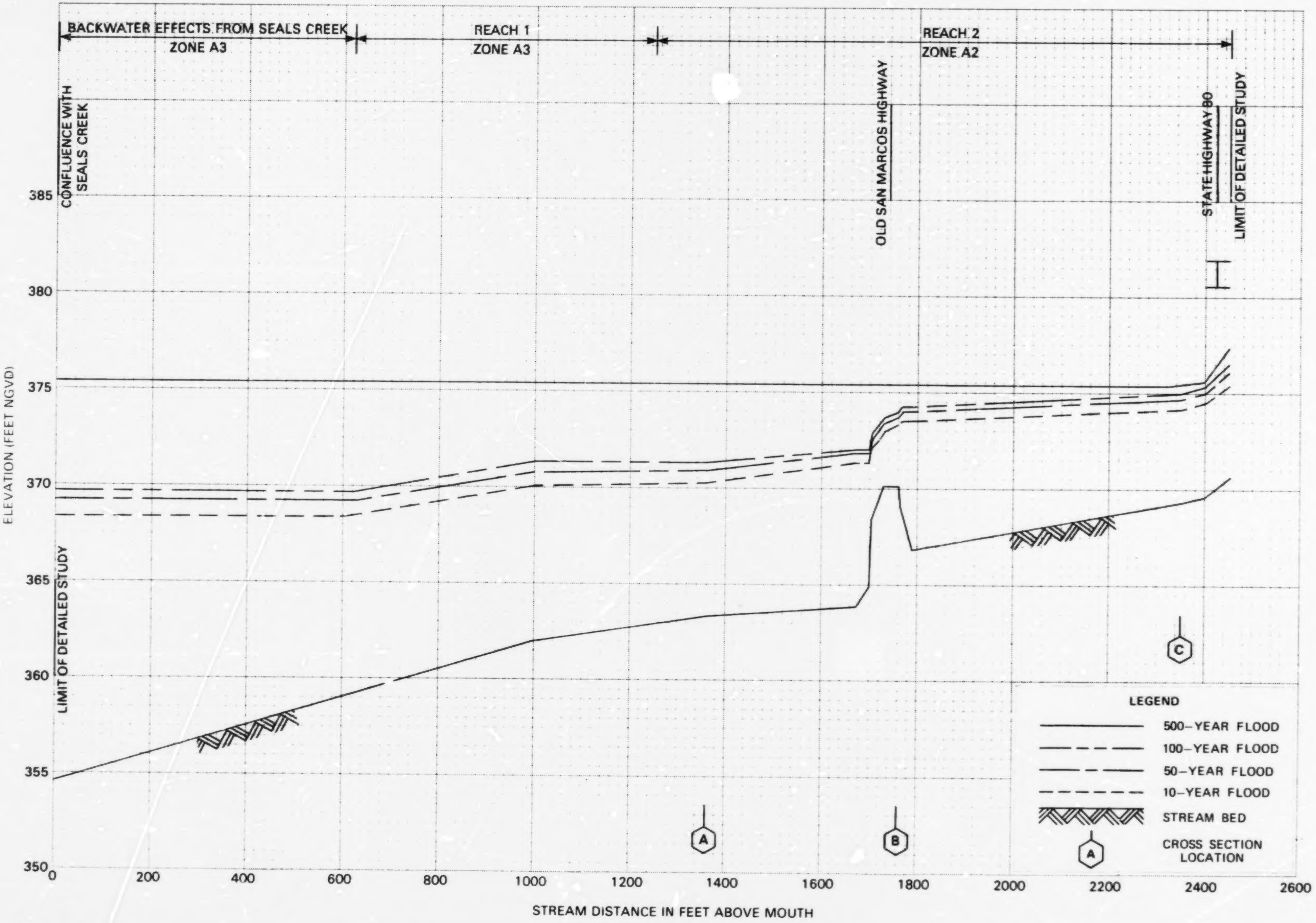


FLOOD PROFILES

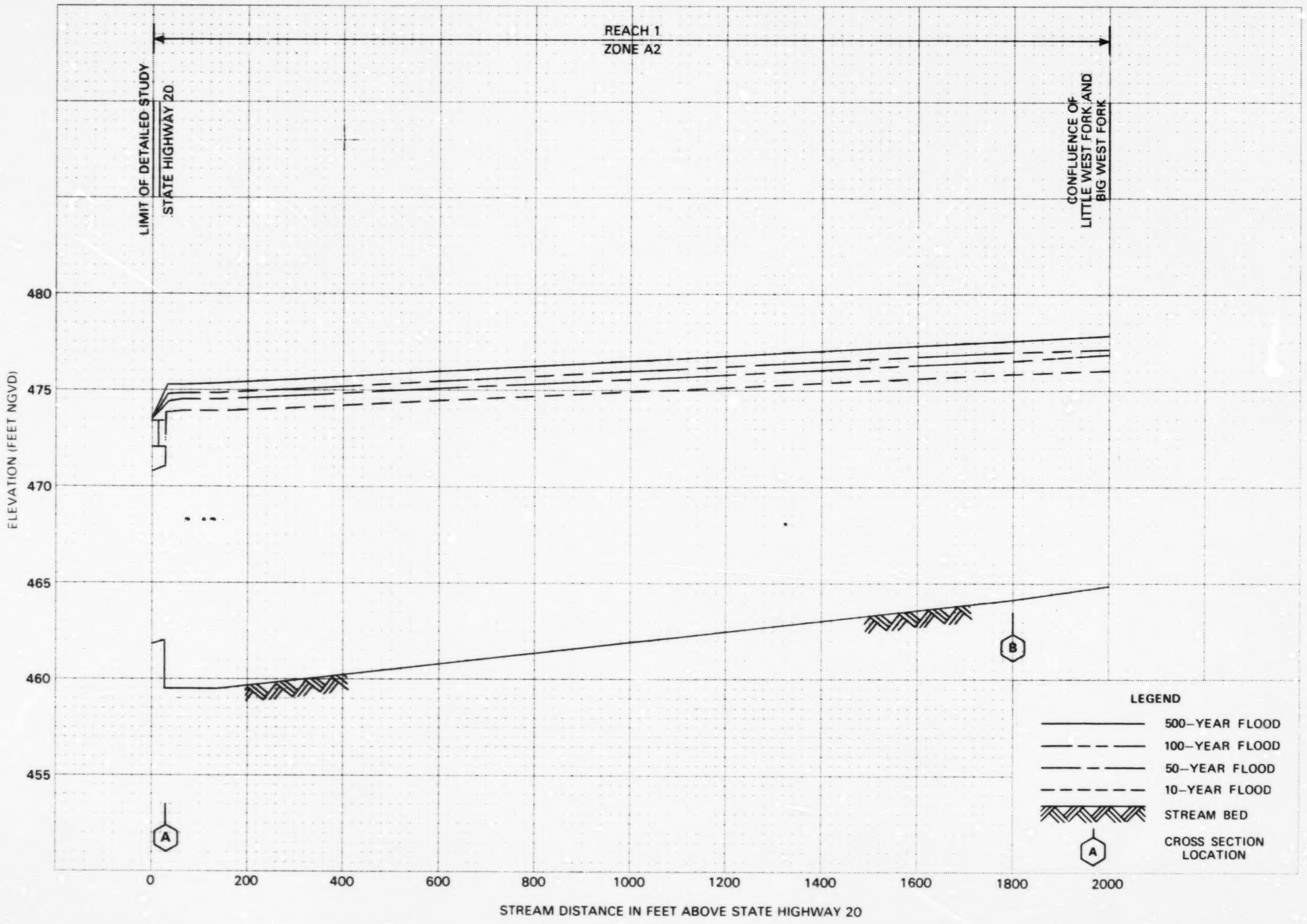
SEALS CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

20



FLOOD PROFILES

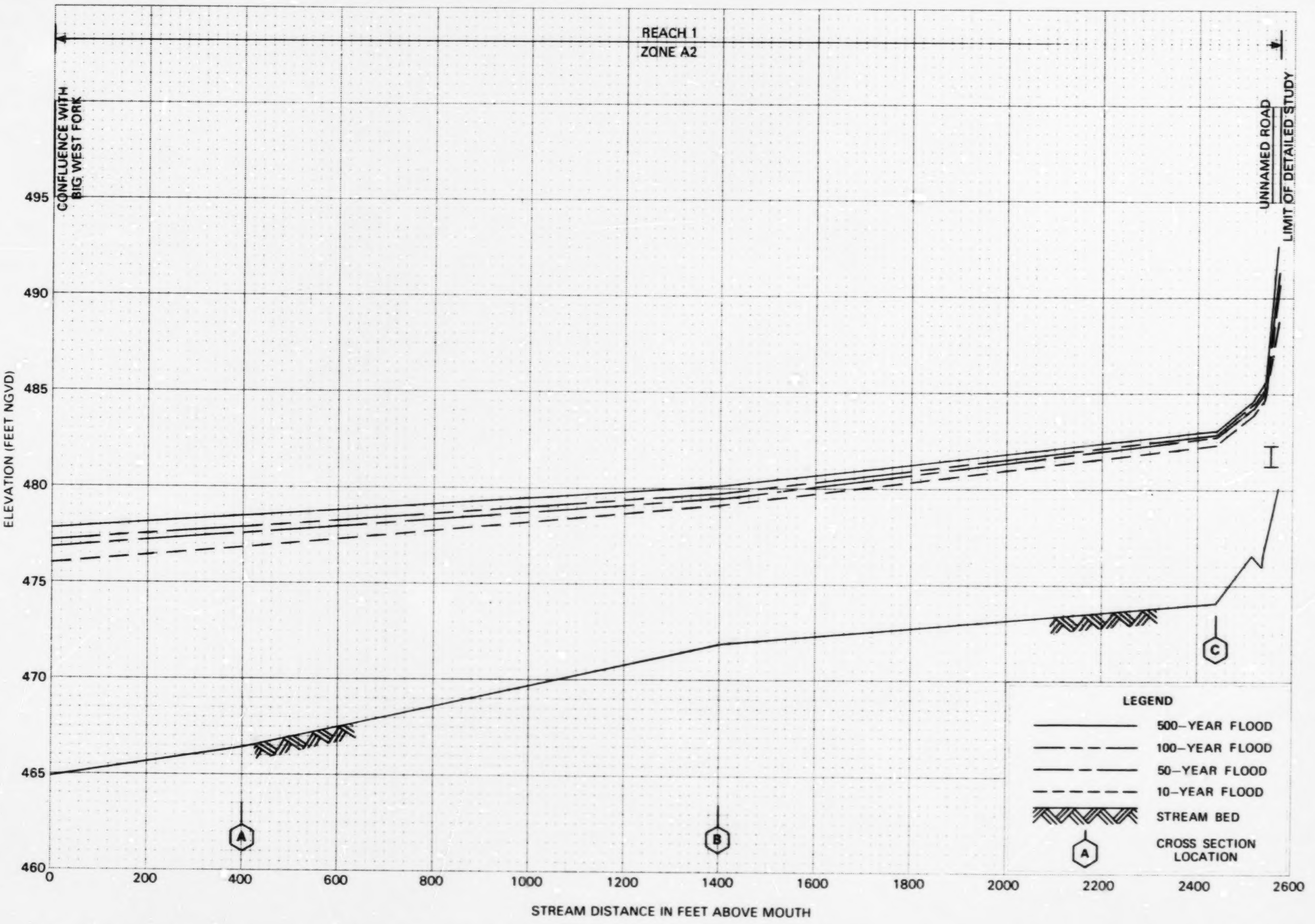
WEST FORK PLUM CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

53P



FLOOD PROFILES

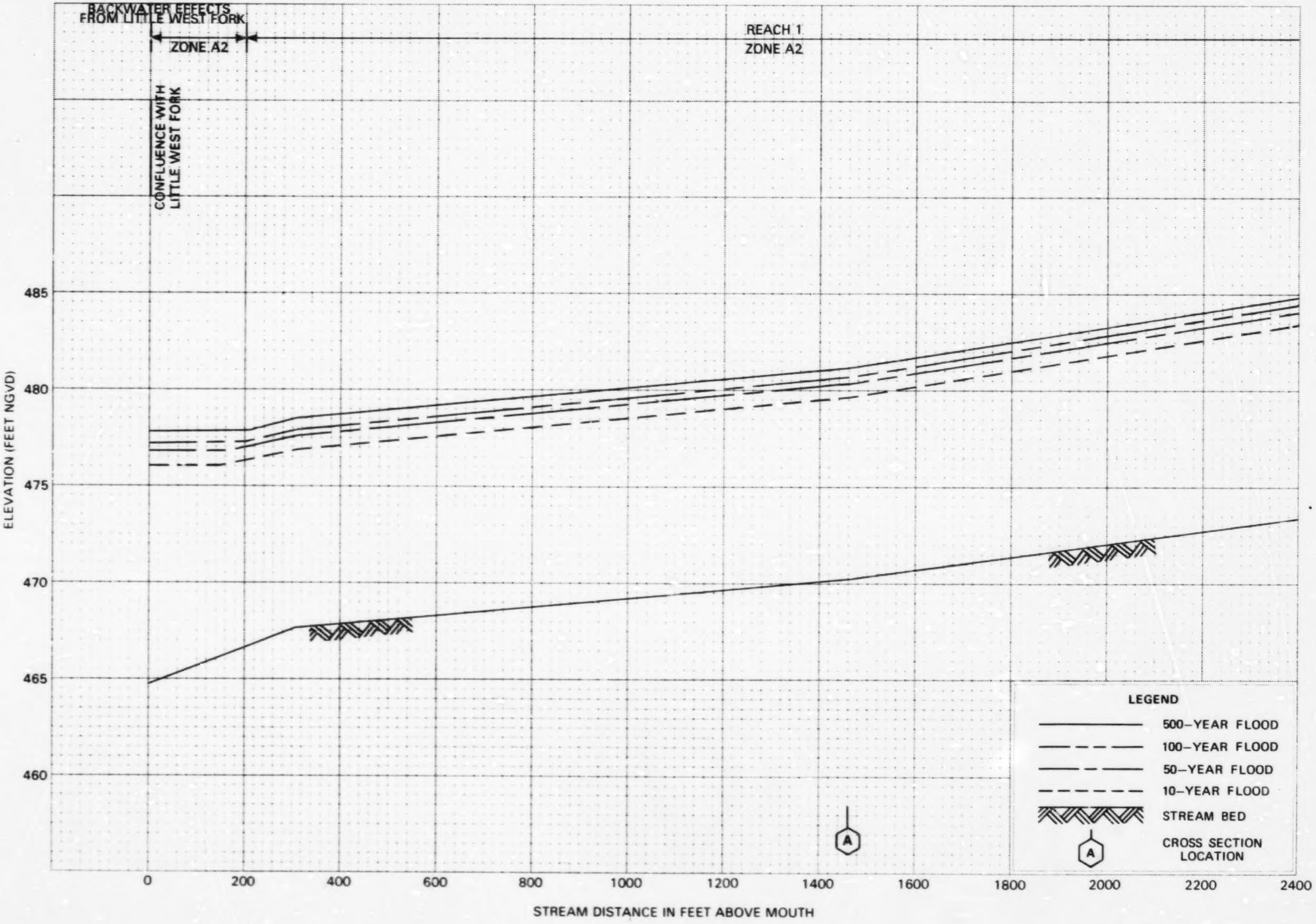
LITTLE WEST FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

54P



FLOOD PROFILES

BIG WEST FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX

(UNINCORPORATED AREAS)

55P

83

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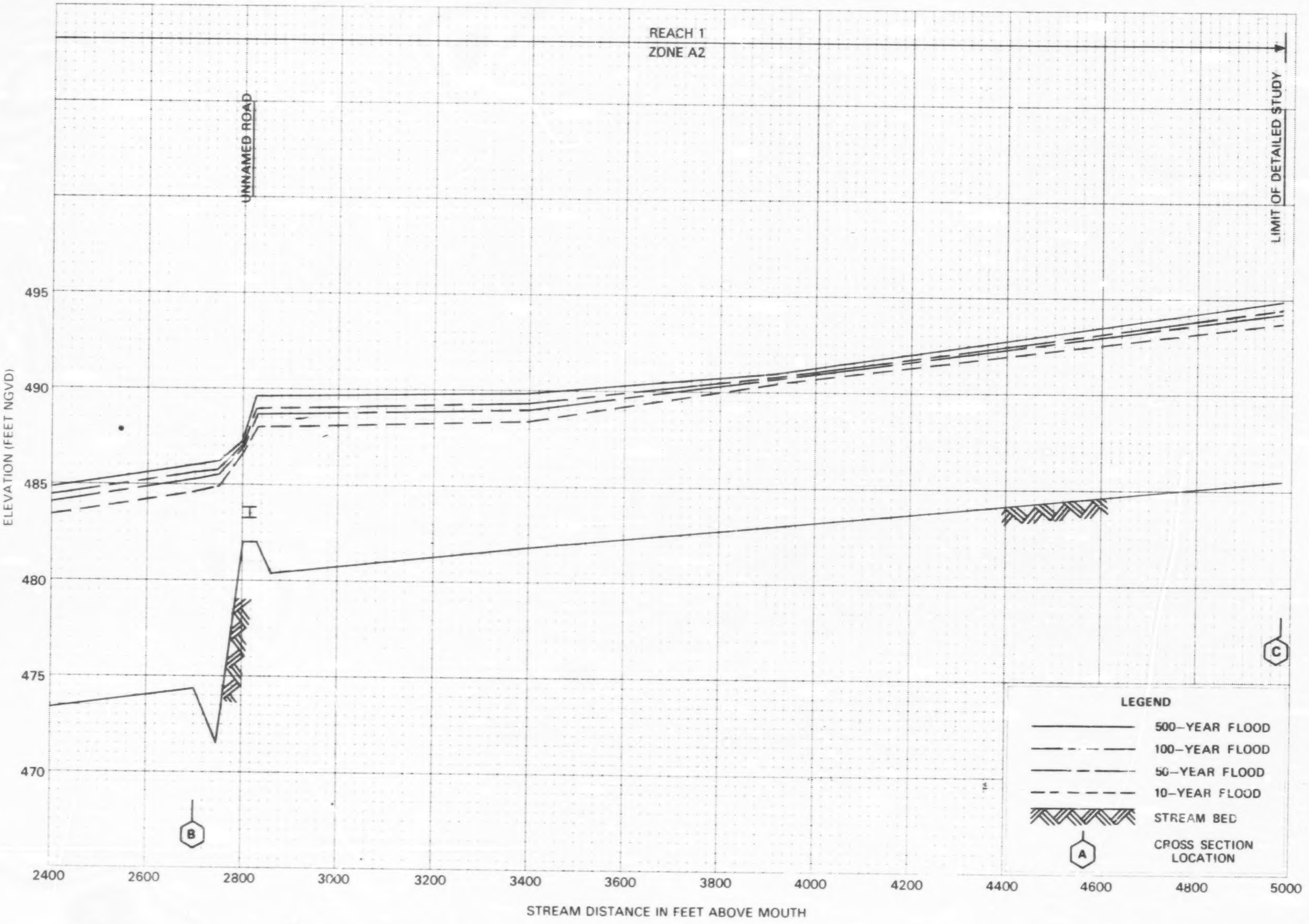

FLOOD PROFILES

BIG WEST FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CALDWELL COUNTY, TX
(UNINCORPORATED AREAS)

84

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